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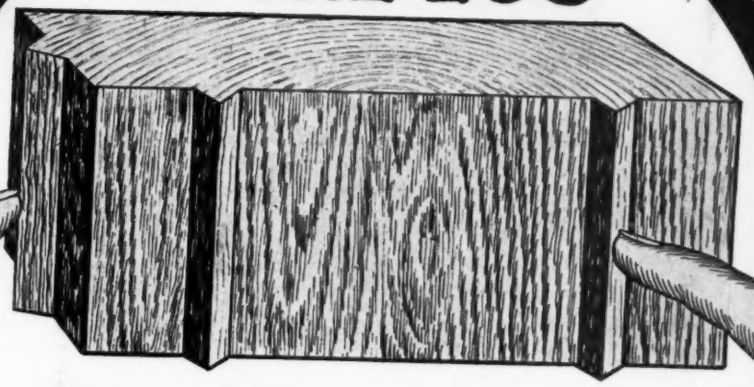

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"Practical Street Construction"

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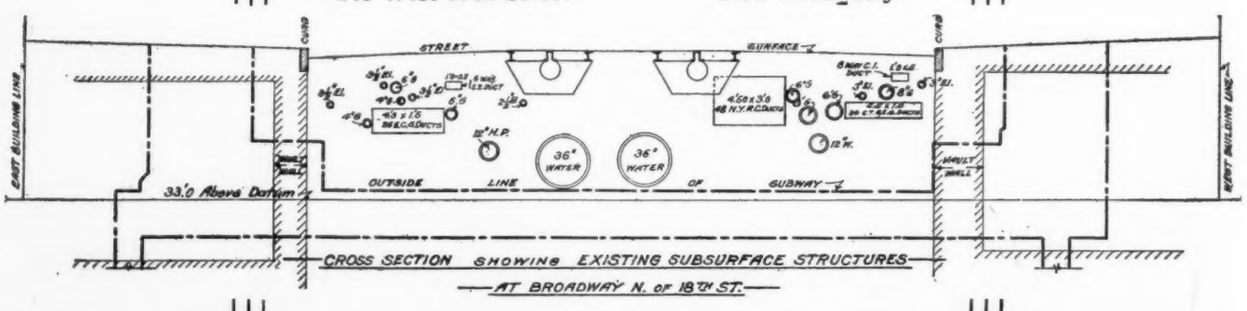

CROSS SECTION SHOWING EXISTING SUBSURFACE STRUCTURES
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Municipal Journal

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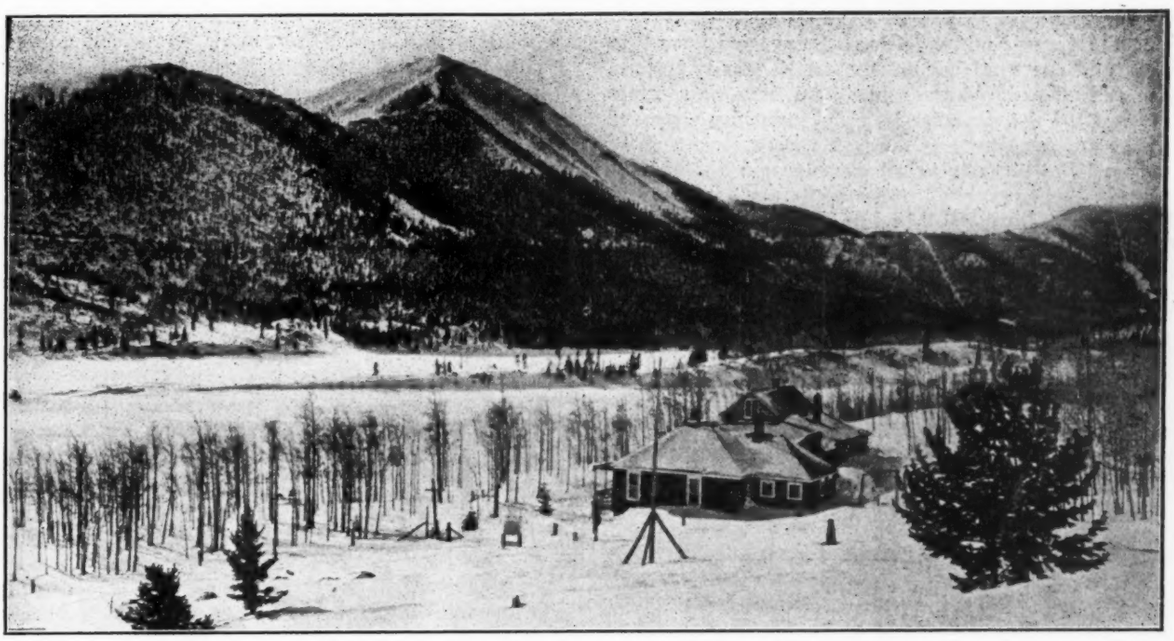
WATER-WORKS OF COLORADO SPRINGS

Freezing and Thawing of Services, Hydrants and Mains—Prevention of Freezing by Increasing Depth—Source of Supply on Slope of Pikes Peak—Water Shed Fenced and Guarded.



LAKE MORAINE STORAGE RESERVOIR. CARETAKER'S RESIDENCE IN FOREGROUND, MT. BALDY IN BACKGROUND.

Colorado Springs has an estimated population of 35,000, of which about 33,000 are reached by the lines of the water works distribution system and all make use of the public supply. The supply is obtained by gravity from a water shed on the south slope of Pikes Peak, which is impounded in a number of lakes and reservoirs. The highest of these, known as reservoir number 7, has an elevation of 12,109 feet and a capacity of 75,000,000 gallons. The outflow from this lake is lead by a flume to another lake 260 feet lower, which also receives the flow from reservoir number 8 through a tunnel over 6,000 feet long. From here it flows through a succession of lakes and reservoirs, part of the distance in natural channels and part in pipe lines. All of these reservoirs and the routes followed by the streams and pipe lines are on city property down to the intake, about six miles from the city.

The drainage area from which the supply is drawn covers 29 square miles. The supply is almost entirely melted snow stored on granite. From the last storage reservoir, Lake Moraine, which has an elevation of 10,246 feet, the water flows over granite boulders with a drop of about a thousand feet to the intake, thus being thoroughly aerated. The city has acquired all the land draining into the various streams of the system, most of it by purchase from the government at $1.25 per acre. That which did not belong to the government, but was owned by private parties, was bought at the best prices obtainable. The land purchased from the government was acquired before the adoption of the present national forest policy. National forest land cannot be purchased now, but the Forestry Department will set land aside for water-shed use of a city or town, and will protect it. The Forestry administration has made great progress along this line during the past few years. A city can adopt its own laws to govern its own water shed and have its own employees enforce them, if desired. The Forestry Department will meet more than half-way any community that wants to protect water-shed land which is under the control of that department. Colorado Springs has had 10,000 acres on the north slope of Pikes Peak set aside for future development under an agreement of this kind.

Of the 29 square miles of drainage area, the city has fenced in 7,500 acres, or about 12 square miles, with a five-wire barbed fence, all of the storage reservoirs being

within this fenced area. A caretaker and guards are kept at the various reservoirs, their duties being to see that no one trespasses upon the city land. No one is allowed upon the water shed without a permit, and permits are issued by the superintendent only. During 1917 only 34 permits were issued and most of these were to relatives of the caretakers. Before anyone receives a permit, the state of his health is investigated; if he has ever had typhoid fever, no permit will be granted, as the city will take no chances of a typhoid carrier visiting the water shed. All caretakers are examined by the city's physician before they go to work. No stock grazing is allowed upon the area.

With all these precautions the city believes that it obtains pure water in the reservoirs, that it is protected from pollution throughout its entire travel through them and to the city, and that no supply in the country can surpass it in quality and safety. During 1917 the monthly average of total solids ranged from 44 to 54 parts per million; the organic and volatile matter varied from 9 to 14 parts, and the total hardness from 10.7 to 19.1 parts. Of free and albuminoid ammonia there were only traces during most of the year, measurable quantities appeared during May, June, July and August, with a maximum of .002 parts. The bacteriological examination showed the colonies at 37°C. varying from a minimum of 6 in September to a maximum of 20 in July, the average being 12. The 22° colonies varied from a minimum of 60 in February to a maximum of 162 in July. Tests for bacilli of the Colon group were negative in every instance except on July 20th and August 8th. The average temperature of the tap water was 56.5°, varying from 48.2°, the average for March, to 64°, the average for July.

The water so collected, after reaching Lake Moraine reservoir and being aerated in the thousand-foot fall previously referred to in Ruxton creek, enters a 14-inch pipe line in which it falls about 2,500 feet to a "settler." From this point it is carried in 16-inch, 14-inch and 12-inch pipe lines to the city. In the city are two small reservoirs, one of about 12,500,000 gallons capacity and the other 15,000,000 gallons, each having an elevation of 6,226 feet. In the southeast corner of the city is located the Prospect Lake storage and irrigation reservoir, with an elevation of 6,097 feet and a capacity of about 374,000,000 gallons. On the water shed there are six storage reservoirs, varying in size from 62,000,000 gallons to 864,544,000, and varying in cost from $22,000 for the former to $177,000 for the latter. On December 31st there was in storage in these mountain reservoirs 1,582.5 million gallons, while in Prospect lake and another reservoir an additional 350,000,000 gallons were stored for irrigation purposes.

The distribution system contains about 150 miles of mains, of which nearly 6 miles were laid last year, the sizes varying from 2 inches to 24 inches. Cast iron and steel are used for the mains. Of the total 150 miles, a little over 21 miles is less than 4 inches in diameter. The pressure on the mains varies in different parts of the city from 40 pounds to 150 pounds. There are connected to the distribution system 518 fire hydrants, both public and private, and 1954 stop gates. There were in use, at the end of the year, 12,224 service taps, 265 of which were metered. Although only about 2 per cent of the services are metered, about 26 per cent of the receipts is obtained from metered water. All establishments or buildings using large quantities of water are required to take the same through meters, and the mayor, as commissioner of water and water works, can order the installation of meters on any service and the payment by meter rates instead of by flat rates.

The total consumption for the year averaged 6,054,504 gallons per day, equivalent to 180 gallons per inhabitant, 183 per consumer and 495 per tap. The cost of supplying water per million gallons, figured on the total maintenance expense plus one per cent of the value of the system as a basis of depreciation, was $31.98; while the cost, figured on maintenance, depreciation and interest charges, was $55.77. The value of the water system is figured at $3,355,227, that of the buildings at $22,600, and that of equipment and supplies at $39,214. The outstanding bonds total $1,450,400. The total income in 1917 was $161,252, and the total expense, including interest on the water bonds, was $89,047, leaving an excess of income over expenses of $72,205. Of this amount $44,355 was placed in the sinking fund.

The ordinances and regulations of the Department of Water and Water Works specify, as one of the duties of superintendents of water works, that "he keep correct and complete details of the water works system and of all construction and other work connected therewith and all fire hydrants, pipes and valves." This is the kind of clause that was suggested by us in the May 11th issue as one that should be entered in every by-laws or contract in which are specified the duties of a water works superintendent, in order that the city may not only require the superintendent to keep such records, but may legally claim ownership of the same.

THAWING MAINS, HYDRANTS AND SERVICES.

The superintendent of the Colorado Springs water works, B. B. McReynolds, to whom we are indebted for the above information, has at our request described for us the methods employed by him for thawing services, mains and fire hydrants. As all parts of Colorado Springs are more than 5,000 feet above sea level, while the latitude is that in which cold weather may be expected, the temperature frequently falls to that which might be expected to give trouble with freezing. Superintendent McReynolds describes his methods as follows:

During my first year as superintendent (I have been in charge of the Colorado Springs water system since 1909), we had several blocks of mains frozen and some hydrants, although the winter was not an extremely cold one. Our winter weather here has a wide range of temperature, many days of mild temperature being followed by a sudden drop. The cold periods run from one to two weeks, the temperature ranging from 40° above to 10° below zero, with 30° reached some nights but not often. Frost has been known to penetrate to a depth of 44 inches.

During that winter I found that the frozen mains were shallow ones, in some cases with not more than 24 inches covering. It had been assumed that there would be enough circulation to keep the shallow mains from freezing, but this was not the case. Following this experience, our practice now is to lower all mains below the frost line, giving every pipe five feet of covering, and insisting that all service lines be at least 4½ feet below the surface. If the street department should lower a street grade, we lower our main immediately and do not wait to see whether or not it will freeze the next winter. No mains have frozen since 1910.

There have, however, been frozen services, usually where a gutter has washed out. The consumers install and maintain the service lines all the way out to the main, the services being put in by licensed plumbers. It is difficult to get consumers to insist upon proper depth for their service pipes; in some cases where the danger that a shallow service will freeze is pointed out to him, he has replied, "She didn't freeze last winter and I don't believe she will this one." Some morning he wakes up

with no water and calls up the department and wants to know why he can't get any water. We then put it up to him to call in a plumber and have his pipe thawed out and lowered.

We do not at all sanction the practice of thawing services by electricity or steam, except in cases of necessity where the consumer must have water at once. The idea of a water department advocating thawing services by a method that does not require digging them up and lowering them seems to me a very poor one. If thawed in this way and left with the danger of freezing as great as ever, the consumer wastes water the rest of the winter by keeping his faucets open to prevent freezing. We have enough trouble to keep consumers from wasting water in this way when their pipes are deep, without encouraging them to do so. I think any practice is wrong that does not remedy the fault. It may cost a few dollars more to thaw a service by digging it up and lowering it, but when you have done this you have removed the danger.

Fire hydrants we inspect every three months. In October we inspect, oil and grease them, using a small quantity of graphite grease on the nozzle threads so the caps will not stick, see that the hydrants drain properly, and that everything is in first class shape. If at any time after this the hydrant is opened, we inspect it again. During the winter, or until April if we have a normal cold period, we inspect the hydrant and put one-half pint of shaved soap in each hydrant. The soap we buy in barrels, such as the laundries use. In extreme cold periods we put one pint of common salt in each hydrant. After the cold period is over (in our county it never lasts over two months) we flush the salt out. It is our opinion that the salt solution is hard on the metal and that soap is absolutely harmless, so we use soap until the temperature reaches 15° below, and after that use salt. Also, we use salt where we find a hydrant that drains a little slowly. When we do have a hydrant freeze (and this happens sometimes), we use steam to thaw the hydrant and build a fire around it to draw the frost out of the ground. After this treatment we have no more trouble with that particular hydrant.

SEWER PIPE JOINTS*

Experiences with Sulphur and Sand, Asphaltic and Linseed Oil Compounds—Data Relative to Practice in Fifteen New England Cities.

Henry A. Varney, city engineer of Brookline, Mass., had tried the sulphur and sand joint and by its use had greatly reduced the amount of leakage, but was "apprehensive that such a rigid joint as this material makes from the moment it is poured would result in cracks in the bells or the pipe itself, for it is difficult to bed several lengths of pipe so as to prevent all possibility of movement when the backfilling and puddling are completed."

Bertram Brewer, city engineer and superintendent of water works and sewers of Waltham, stated that for wet ground that city had used both sulphur-sand and asphaltic joints and preferred the latter. The sulphur-sand joints were first used in 1907, but their experience indicated that the joint was too rigid. "The writer has never yet seen a sewer where there was not some movement of the pipes after they were laid. It might be only very slight and, with care, it need be only very slight, but in the case mentioned, where there was no appreciable change and the pipe was subjected to very little stress, failure resulted. Further experience goes to show that the decision to abandon the use of the sulphur-sand joint was a sound one. In 1917, a 300-ft. line of 5-inch pipe laid ten years before, where the joints were of the type now under consideration, was taken up and re-laid at a lower level. When excavated, this sewer to all appearances was at a true grade and perfectly sound; but when jarred out of line, over one-third of the pipes were found to be completely fractured at the back of the bell. The annular cracks were so fine that they could not be seen until the sewer was moved."

Frank R. A. Marston, designing engineer with Metcalf & Eddy, reported that that firm had used the sulphur-sand joints on several contracts. "Unless the sand is very fine and practically free from clay, the resulting joint is apt to shrink on cooling, causing objectionable cracks. Further, the sand, if too coarse, tends to settle out of the mixture, causing trouble in pouring and shrinkage of the joint. Some very successful work, however, has been done with this material. It appears to require more care in heating than some other mixtures. The chief difficulty has been to get a satisfactory mixture, due almost entirely to the size and quality of the sand. Also, the joint is absolutely rigid, as is the case with cement mortar."

Mr. Varney reported that Brookline, Mass., in 1909 used a mixture of asphalt and sand in laying a 30-inch sewer and this gave so much better results than anything that they had tried previously that they continued to use it and up to the present time they found nothing more satisfactory, considering the ease of manipulation, cost, etc. "The method of making a joint with this material is similar to that used for lead joints, except that the material does not have to be calked. It also requires very little heat to bring the compound to the proper consistency, a small woodfire being all that is necessary. We take the precaution to fill the angle between the bell and the body of the adjacent pipe with cement mortar, but do not think that this is absolutely necessary, especially in the smaller size of pipe. We have recently inspected some of the first work done with this material and have found the joints in perfect condition, and can see no change in the consistency of the compound itself."

Mr. Brewer stated that since 1907, asphaltic compositions have been used invariably in wet places in Waltham, and thus far no failures have been discovered. "The Warren Bros. pipe jointing compound has usually been employed. A jute gasket is calked into place and the compound poured into the joint in the usual manner. In shallow trenches every third joint, and in deep trenches every other joint, is made up in the trench; the rest are poured on the bank. With the asphaltic as well as with the sulphur-sand joints, only deep and wide socket pipe was used. Both the inside of the bell and the end of the spigot should be scored by the manufacturer, else the pipes are liable to pull apart. Care must be taken to see that the compound does not break through or the gasket protrude into the sewer. The asphaltic joint has been used in Waltham on domestic sewers only, and the danger of hot water melting the compound has never arisen. Its great advantage is that it has considerable flexibility and can be used in a wet trench and without an under-drain, unless there is more ground water than can be taken care of with a trench pump operated with a gasoline engine." Mr. Brewer believes that for deep trenches a joint is desirable which will allow immediate backfilling over it. "The saving in cost effected by throwing the bottom layer of earth ahead of the pipe just laid, on top of it as backfilling, is of great importance to those who pay the bills."

David A. Hartwell, formerly chief engineer of the Fitchburg Sewage Disposal Commission, referring to

*Continued from page 411.

DATA RELATING TO SEWER PIPE JOINTS (PREPARED BY HENRY A. VARNEY).

City or Town.	Material Used.	How Long Used.	Why Is this Material Used.	Work Done by City or Contract.	Other Material Used.	Have you Had trouble from Tree Roots?	Does Present Type Prevent Roots?	Does it Make Water-Tight Joints?	What Material Used in House Connections.	Remarks.
Boston	Cement mortar	30 yrs.	No better for all purposes	Both	None	Yes	No	No, except with extreme care	Cement mortar	Experiment under way with special material.
Brockton	Portland cement	25 yrs.	Think it the best	City	G-K compound	Yes	No	Yes	Portland cement	Iron pipe with lead joints used where roots give trouble.
Brookline	Asphaltic compound	10 yrs.	Gives best results	Contract	Cement, sulphur and sand, G-K compound	Yes	Yes	When carefully used	No regulations	House connections laid by private contractors.
Cambridge.	Cement mortar	28 yrs.	Considered practical	City	Bituminous filler	Some	Yes, if carefully made	Yes	Cement mortar	
Concord, N. H..	Cement mortar	25 yrs.	Makes effective joint	City	Roman cement	Yes	Yes	Yes, when well made	Cement mortar	
Haverhill.	Cement mortar	Many yrs.	To prevent entrance ground water and tree roots	City	None	Yes	Yes, if done properly	Yes	Cement mortar	
Lawrence.	Cement mortar	Always		City	None	Yes	No	No		Combined system of drainage.
Lynn.	Cement mortar	40 yrs.	Most convenient	City	None	Yes	No	Nearly	Cement mortar	Iron pipe with lead joint used where tree roots give trouble.
Malden.	Cement mortar	26 yrs.	Considered best	Both	G-K compound	Yes	Yes, if made properly	Yes, if made properly	Cement mortar	
Melrose.	Cement and G-K compound	G-K past 2 yrs.	On account of wet trenches and tree roots	City		Yes	Yes	Yes	Any	Troubled with tree roots in house connections and some main sewers.
New Bedford...	Cement mortar	Many yrs.	For convenience and economy	City	G-K compound	No		No	Cement mortar	
Newton.	Sulphur and sand	11 yrs.	Permanent watertight and resistant to roots	Both	Cement mortar and bituminous compound	No	Yes	Yes	Sulphur and sand	
Pawtucket.	Cement mortar	20 yrs.	Most satisfactory	Both	None	Very little	Not entirely	Not entirely	Cement mortar	Quality of work depends upon inspectors.
Worcester	Cement mortar cloth-wrapped	20 yrs.	Because it has given good results	City	None	No	Yes	Fairly	Cement mortar	
Metcalf & Eddy.	G-K compound	5 yrs.	A poured joint considered best	Contract	Sulphur and sand	No	Yes	Fairly so	G-K compound	

practice in Fitchburg, stated: "Where the water plane was normally above the pipe, and where there was water in the trench, a poured joint of what is commercially known as G-K compound was used almost wholly. Other similar material was used to some extent, but G-K seemed to be more satisfactory. A round commercial gasket was used. The joint was first calked with dry jute, using no more than enough to assure a uniform annular space and to prevent the jointing material from running into the pipe. Joints were poured when the water stood as high as 6 to 8 inches above the invert, and no difficulty was found in making the joints tight enough to prevent any objectionable leakage. The G-K was melted in a gasoline kettle owing to the better control of the heat than when wood is used. It was found advisable to keep the same workman on the kettle, as there was less liability of injury to the material when a man has had some practical experience. . . . The cost of joints made with G-K compound was found to be about one-third more than cement joints, and owing to this additional cost it was decided to use this material only where there was water in the trench."

Mr. Marston said in his discussion:

Since 1913, Metcalf & Eddy have used the G-K compound, now made by the Atlas Co. of Lincoln, N. J. This material, said to be made largely of vulcanized linseed oil and clay, resembles vulcanized rubber or coal tar in appearance. It is delivered to the work as a solid, in barrels. It is easily melted by heating in an iron kettle over a fire, preferably using gasoline or kerosene, so that the heat may be controlled. Sections composed of two or three pipes may be jointed at the side of the trench, provided the pipes are set in a suitable wooden cradle to ensure true alignment. In lowering sections so made into the trench, a piece of timber should be run through the pipes in order to support their weight and prevent the joints or bells from being broken.

Asphalt has not been used, or any of the bituminous compounds, to any extent, because of the danger of hot water or steam melting out the joint due to the low melting points of most of these materials. With a sufficiently high melting point, this objection would be covered.

Some trouble has been experienced during cold weather with G-K compound, due to its failure to stick to the pipes; especially in the smaller sizes where the inside of the bell is glazed and there are no scorings. From tests made both in the laboratory and on contract and day-labor work, the results obtained with G-K compound have been satisfactory.

The cost of a jointing material and labor will be from 50 per cent to 100 per cent more with a poured joint than with cement, judging by average prices received. Part of this excess cost is doubtless due to the unfamiliarity of contractors in general with poured joints for vitrified pipes.

Good results have been obtained with a sulphur-sand mixture, with bituminous compounds such as those manufactured by Warren Bros., Boston; Pacific Flush Tank Co., New York; the Standard Paint Co., Boston, and others, and with G-K compound made by the Atlas Co.

CLEVELAND'S SEWERAGE SYSTEM.

Studies of Rainfall, House Sewage Flow and Capacities of Existing Sewers Made Basis of Design—Treatment of Sewage.

Probably the first sewer built in Cleveland was an open public sewer built 66 years ago along Spring street under the old depot which was on piles, and discharging into the lake. Few publicly built sewers, however, have been in existence more than 50 or 60 years. In the early days of the city the construction of sewers by no means kept pace with the street mileage. As in other cities, because the science and art of sewerage were in their infancy, the sewers first built were designed largely on assumption without proper basis, or adapted to existing conditions only, without regard to future changes and growth. The development of the Cleveland system was described in a paper before the Cleveland Engineering Society by Robert Hoffmann, commissioner of engineering of that city, from which paper the information in this article is drawn.

Study and observations relating to frequency and intensity of rain storms continued over a period of some fifteen or twenty years furnished the first reliable data for designing storm sewers. Studies also were made to determine the proportion of the rainfall that reached and was carried off by the sewers and the rate at which this took place. Further observations were made to determine the rate and fluctuations in flow of house sewage. The carrying capacities of existing sewers of various sizes and different materials were studied also.

For the most part, the sewers of Cleveland are on the combined system, although in a few suburban sections separate sewers have been provided for house sewage and for storm water. The ultimate outlet for all the sewers—separate, storm and combined—is in Lake Erie. To avoid building large, expensive sewers all the way to the lake shore, use was made of the various creeks and rivers that flow into the lake for sewer outlet purposes. In order that these streams might not be unduly contaminated with sewage, the dry-weather flow is not discharged into streams, but what water enters them leaves the sewers at overflows, from which it is led by storm water outlets to the streams. The dry-weather flow, and such flow diluted with a certain amount of storm water, is conducted past the overflows through a system of intercepting sewers which ultimately carries it to treatment plants in order that the pollution of the lake which the sewage would cause may be very greatly reduced.

Probably almost all materials used in sewer construction have been employed to some extent in the Cleveland system. Masonry and vitrified clay pipe have been employed to a greater extent than other materials, how-

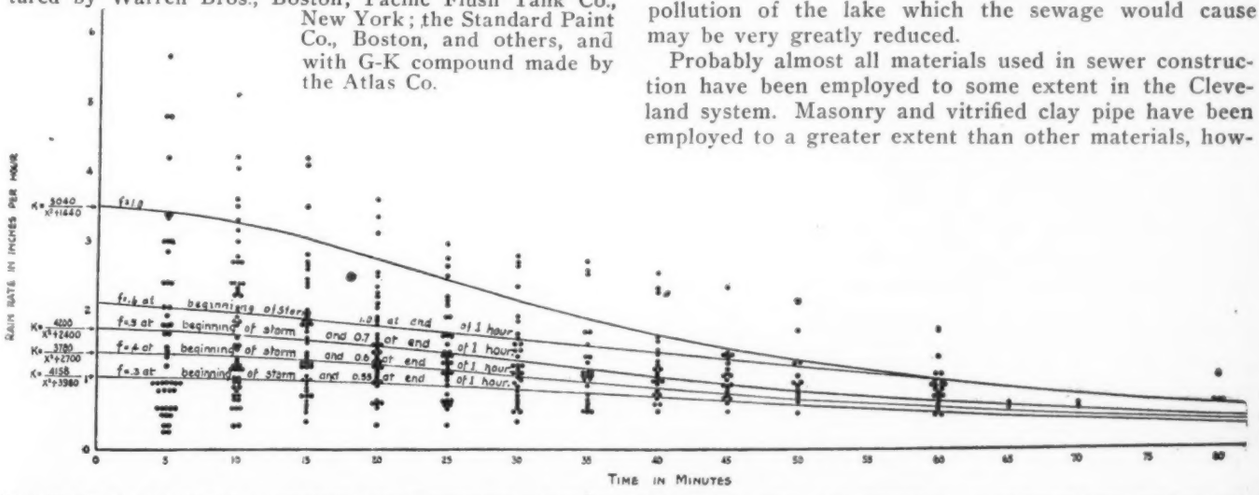

RAIN RATE IN INCHES PER HOUR
TIME IN MINUTES
K= 3040 / X+1440
f=1.0
f=0.8 at beginning of storm and 0.2 at end of 1 hour
K= 4200 / X+2400
f=0.7 at beginning of storm and 0.7 at end of 1 hour
K= 3780 / X+2700
f=0.6 at beginning of storm and 0.6 at end of 1 hour
K= 4158 / X+3960
f=0.55 at beginning of storm and 0.55 at end of 1 hour

DIAGRAM OF RAINFALL CURVES AND SHOWING RATE OF RAINFALL FOR ALL STORMS AT CLEVELAND FROM 1890 TO 1907.

K represents rate of run-off in cubic feet per second per acre; X represents time in minutes; f represents degree of imperviousness of surface. The second curve from the top is the one commonly used.

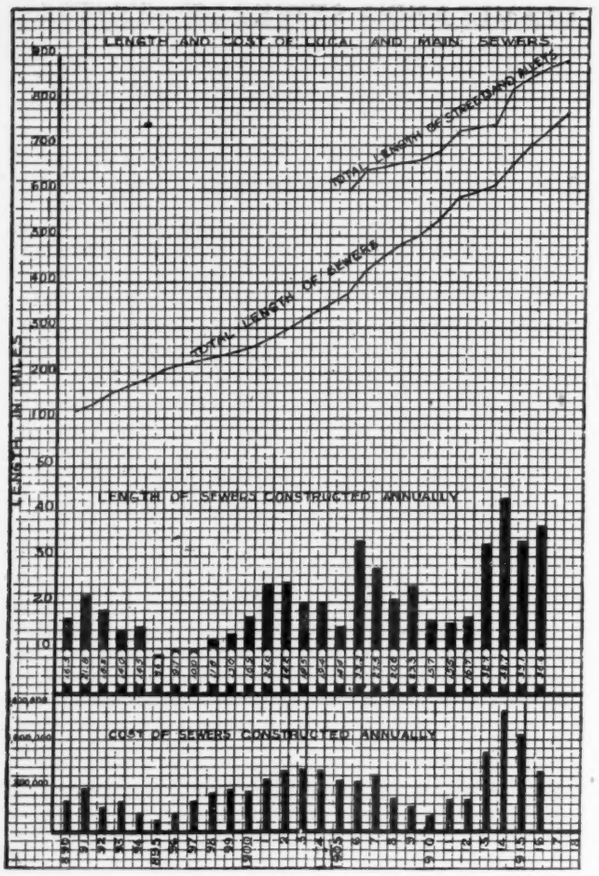

LENGTH AND COST OF LOCAL AND MAIN SEWERS
TOTAL LENGTH OF STREETS AND ALLEYS
TOTAL LENGTH OF SEWERS
LENGTH IN MILES
LENGTH OF SEWERS CONSTRUCTED ANNUALLY
COST OF SEWERS CONSTRUCTED ANNUALLY

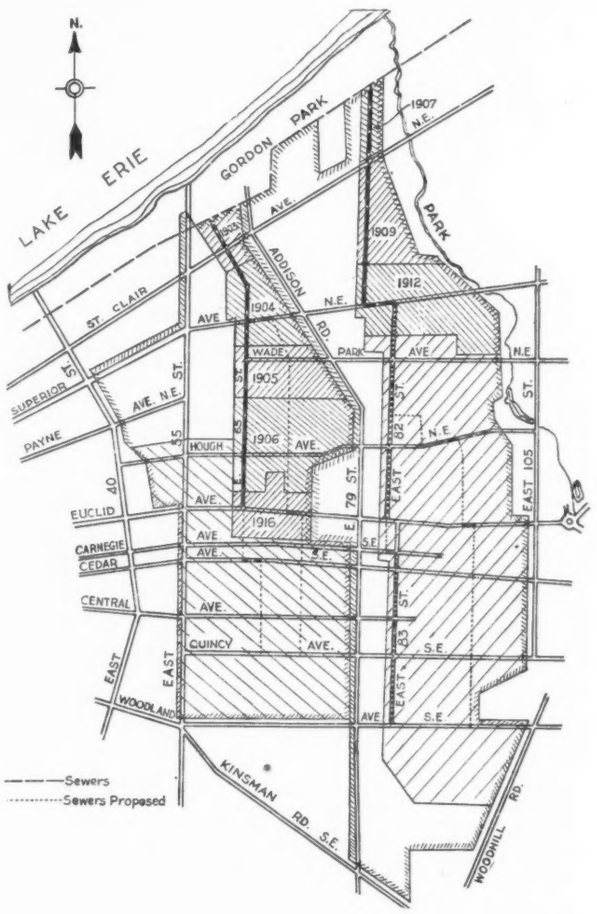
DIAGRAM SHOWING PROGRESS IN SEWER CONSTRUCTION AND RELATION BETWEEN STREET MILEAGE AND SEWER MILEAGE.

ever. Concrete has been used largely for foundations and to some extent in reinforced monolithic constructions for sewer arches. A few sections of sewer have been built of concrete block and a few sewers have also been built of segmental blocks of clay.

In order to accumulate as complete a collection of data as possible for designing storm water sewers, rainfall observations have been taken over a long series of years. These have been plotted and a rainfall curve evolved which is now generally used in the designing of sewers for the city. This curve makes due allowance for the varying intensities of rainfall as a factor of the time element and also takes into account the probable proportion of the rainfall that may reach the sewers as affected by the imperviousness of the soil. Mr. Hoffmann said that the experience in Cleveland seems to show that few sewerage systems capable of discharging a cubic foot of flow per second per acre of drainage area cause much trouble by reason of the sewers being overtaxed and a consequent flooding of basements along their routes.* However, he does not believe that this would be a safe basis to assume in territories all paved and built up so that a large proportion of same are under roof, but a more liberal assumption must be made in such cases. The capacity named, however, answers very well in residential districts and has been employed where existing systems are being studied with the object in view of rebuilding those found of insufficient capacity.

For the dry weather or house sewage flow the calculation has been based upon an average flow of 100 gallons per capita per day, with a maximum of 400 gallons for short periods of time, which also allows for some infiltration of ground water and a certain amount of rain water. The overflows are so designed that no sewage will overflow through the storm outlets until the house sewage is diluted with from three to five parts of storm water.

The quantity of house sewage is increasing with the growth in population and is becoming something of a menace to the water supply and a nuisance to occupants of lands along the lake front in and near the city. This was recognized some years ago, and studies were begun to determine the quantity of sewage and the best method of treating it. These studies have been practically completed and tentative plans made for sewage disposal so that now the department having this work in charge is ready to proceed with the construction work; in fact, considerable progress has been made. The general plans contemplate three sewage disposal plants, one known as the easterly plant, located on the shore of the lake at East 140th street; the southerly plant located on the Cuyahoga river, and a third on the lake shore at the westerly end of West 58th street. Each of these will treat the sewage from one of three drainage districts into which the city is divided. The land required for all of them has been secured and part of the work of construction completed. As the exact method of treatment has not been fully approved, only such portion of the work has been placed under construction as could be used to advantage in whatever method of final treatment



CONSTRUCTION OF RELIEF SEWERS.

Shaded areas represent territory the E. 65th street and E. 82nd street sewers are supposed to drain ultimately, thereby relieving sewers in E. 55th and E. 79th streets, now severely overtaxed. The amount constructed each year and territories drained are indicated on the map.

*This is not a safe rule for many cities, however—Editor.

might be adopted. This consists principally of preparation of the site, excavation work and outlet conduits.

Mr. Hoffmann described at some length the legislative procedure necessary preparatory to constructing a sewer and also the method of paying for the sewers. The former, as is the case in many large cities, is somewhat complicated and requires that legislation for a sewer must be started before June 1st of a given year if the sewer is to be constructed during the following year. The city assesses a part of the cost against the property and pays the balance by issuing bonds. The assessment is theoretically based upon the benefit accruing to the land by reason of the sewer construction; but in practice it is assumed that such benefits are in proportion to the frontage of the property along the sewer. The city therefore assesses so much a front foot, but charges all property an amount that is estimated to be the cost of a local sewer under average conditions. For many years the assessment was $2.00 a foot, but recently has been increased to $2.50 a foot.

Although the city bonds pay a considerable part of the cost of sewers, Mr. Hoffmann does not think that the construction of sewers should be considered as causing an indebtedness. In a modern city, property without sewer facilities is undesirable and not in demand, and therefore has less value than land located where sewerage is provided. This means, in the first place, that the land cannot be used to its best advantage; next, that the city does not get the benefit of taxes assessed upon the increased value that the sewer would give to property nor upon buildings that probably would not be constructed until sewers were available. It would seem, therefore, that a sewer is a distinct asset to a city, adding to its value and increasing its income.

AMERICAN WATER WORKS ASSOCIATION CONVENTION

Description of the Thirty-eighth Annual Convention which Met Last Week at St. Louis, Missouri—Changes in the Constitution Giving Closer Union between Active and Associate Members—Committee Reports.

Reported by CHARLES CARROLL BROWN.

To an old member of the Association, who has not been present at a convention for several years, for the first two days it had the appearance of a school with Johnson acting rather as the principal, and with Fuller and Metcalf as the instructors or lecturers, and Chester as a sort of adjunct professor, presenting what he considered important among the omissions of the others. The rest of us sat and listened, asking occasional questions when we wanted more detail or light on some point not touched upon.

And the school was a very good one, the instructors of the best in both matter and manner, and the agreement almost perfect. Only Mr. Chester had any tendency toward variation from strict orthodoxy, and he was correspondingly refreshing, like a bit of spicy flavoring after a rather heavy and ordinary piece de resistance of a first-class banquet.

After the opening ceremonies of the Institute on Monday evening and the report of the executive committee on Tuesday morning, instruction began under Principal Geo. A. Johnson, who presented the report of his committee on revision of the constitution. This report, which, with full explanation of the proposed changes, was printed and in the hands of the members, was so satisfactory that the changes were adopted unanimously and practically without discussion.

The Association is evidently well satisfied with its present close connection with the manufacturing interests in the water works field, and makes it still closer by admitting to active membership the technical experts employed by associate members. From the point of view of their value to the society as such technical experts, this is merely a recognition of such value and is beyond criticism if such members act as independent individuals.

The controversy of recent years over the selection of candidates for office has been settled with apparent satisfaction by following the general principle adopted by the American Society of Civil Engineers, though the details differ in the interest of simplicity and economy. Twelve trustees selected from six districts insure distribution of the majority of the membership of the executive committee over the country, it being the intention to change the boundaries of districts from time to time so as to keep the number of active members in the districts as nearly equal as possible. At present this puts eight of the twelve trustees in the area east of the Mississippi and north of the Ohio, unless District No. 1 should have a trustee from western Canada. The officers, including the trustees, are to be nominated by a committee selected, one from each district, by the members residing in the district, the method of insuring the representation of every member in the vote, if he desires, being as simple and inexpensive as possible. If the members do not secure the representation they desire in the official family it will be very largely their own fault.

A convention committee is provided in one amendment, whose function is to inform itself concerning facilities of applicants for the conventions and report before the vote is taken by the convention, and also to visit the city and ascertain its capabilities before finally making the decision. Since the Water Works Manufacturers' Association has charge of the exhibits and of the entertainment features of the conventions, and this association is made up of associate members of the A. W. W. A., co-operation of convention committees of the two associations is provided for and associate members vote in the selection of the place of meeting, this provision of the constitution not being changed. Custom is hard to change, and the writer has not attended conventions recently, but the character of some of the entertainments offered at St. Louis was such as to make it incumbent on the Association to assume some control over them. It was said to be the first of the kind given this Association, and we are told not to look a gift horse in the mouth, but in these days when teeth are accused of being the source of most of the ills that flesh is heir to, this injunction may well be relegated to the waste basket.

The last amendment classified the situation regarding the financial relations of the Association with its local sections.

Mr. Johnson then gave the report of the committee on publications, which was organized late in the year to consider ways and means of increasing the value to the members of the Association's publications. It recommended that committees on progress in various lines be provided who should make frequent reports directly to the publication committee as well as to the conven-

tion at its annual meetings, the co-operation of the members being depended upon to give the desired freshness and completeness to the monthly publication. If necessary, the papers presented before the convention should be edited to cut out the repetitions unavoidable in a number of papers on the same subject, and to eliminate material of purely local interest. While the report of the committee does not recognize the difficulties in the way, on the one hand of getting the material desired, and on the other of getting rid of the material not wanted, it is in the right line and indicates a general procedure which should greatly benefit the membership, if it is intrusted to a competent editor.

The report of the committee on revision of standard specifications for cast iron pipe and specials was moved up from Friday to Wednesday morning and presented by Walter Wood, a member of the committee. It gave the results of a questionnaire replied to by about 50 cities in the A. W. W. A., and about 100 in the N. E. W. W. A, showing that nearly three out of four thought revision desirable; about the same proportion desired uniform outside diameter, and still larger percentages desired revision in other particulars. After some discussion in which it was made clear that the changes could not be further formulated until the committee had further authority from the Association, and that no changes would be put into effect until after the war, the desired authority was given. Mr. R. D. Wood stated for the manufacturers that what is needed is an international specification, especially as to chemical constitution of iron, or at least one which will open the markets of the world to American manufacturers in competition with the other large manufacturing nations.

Mr. Johnson presented at the Tuesday evening session the resolutions proposed by a special committee regarding treatment of water supply questions during war times. A most convincing statement was made of the necessity for priority in permission to purchase and transport a list of materials essential in the operation of water plants, particularly their purification departments, and drafts of letters to Director McAdoo and others were offered for approval and at once adopted.

The second question considered by the committee was that of increase in rates on account of war conditions, and issue of bonds for necessary construction. Each company or department has its own problem and, to secure equitable treatment from the authorities controlling rates, the operators must show what their actual conditions are and what must be done to improve them so that the plants can live. What must be done in this line depends also very largely upon the statutes and the bodies controlling rates, whether state or local, boards or councils. The report and Mr. Chester in discussion laid emphasis on the necessity of making all the savings possible, the authorities always being more ready to come to the aid of those organizations which are doing all they can to meet the situations before them. Mr. Metcalf called attention to the fact that wage increases in water works organizations had not been as great as in other employment, but would follow soon, and this prospect must not be overlooked in estimating the future cost of operation. In these requests for increases in rates, questions of valuations of plants, and particularly of increases in valuation, should be omitted from consideration. Efficient men are hard to find to fill vacancies, and those now engaged should be retained at any reasonable increase in wages. If they are not, their places must be filled with less efficient men and probably at equal or higher wages, with consequent increase in cost and decrease in efficiency.

In these days of conservation it can with propriety be suggested that to most of the members a reduction in the time devoted to the convention and, consequently, in the money spent in attending it, as well as in providing the entertainments, would have been quite endurable if not really preferred. It might have increased the total attendance and would have kept the attendance together better for the full time of the convention. The total registration, including guests, was nearly 500, that from out of town somewhat less than 400, active members leading with 180 in attendance.

The slate presented by the nominating committee was accepted and the officers elected were:

Charles R. Henderson, Davenport, Ia., president; Carleton E. Davis, Philadelphia, vice-president; Allan W. Cuddeback, Paterson, N. J., and J. J. Hinman, Iowa City, Ia., trustees. The convention will meet next year in Buffalo, N. Y.

PAPERS AT THE CONVENTION.

The papers listed on the program were presented according to schedule except two whose authors were absent and the four on special features of the St. Louis water works which were side-tracked by the special orders of discussion of committee reports and the late beginning of the session of Wednesday morning. They will be published and will supplement and explain the observations on the inspection trip to the Chain of Rocks station Wednesday afternoon and the excellent statement of the plan of operation distributed to the members.

G. W. Fuller's lecture on "Emergency Construction Due to War Conditions" was on the lines of his recent address to the American Society of Civil Engineers and he used the same illustrations. This was a very interesting presentation of the data available regarding the matter in the various government offices, which were gathered and put in their proper relations to make a complete story, embellished by some details available only to one rather closely connected with the work; Mr. Fuller and Mr. Metcalf being members of the civilian committee having supervision over the sanitary features of the camp and cantonment construction. The differences between regular and emergency work were emphasized and the reasons for differences between estimates and costs and for excessive cost were given. The really wonderful results attained were praised and the advantages to the work of the cutting of departmental red tape by the civilian committees acting in advance of appropriations or authorizations were clearly shown. The good team play of these committees was responsible for their success, in the opinion of Mr. Metcalf.

While E. R. Conant's paper on the Savannah artesian water supply was largely local on account of the peculiarities of the local conditions, it contained much of general application. One point brought out and emphasized by questions in the discussion was the effect of increase in pressure upon increase in consumption. Thus an increase in pressure from 75 to 115 lb. increased the rate of pumping from 4,000,000 to 7,000,000 gallons a day, or in other words 52 per cent increase in pressure corresponded to 75 per cent increase in water pumped. Some of this increase in flow is due to increase in waste and leakage on account of higher pressure. In the effort to conserve the supply and reduce the cost of pumping, the pressure is reduced when consumption is low, as at night, when low pressure will cause the least inconvenience and will reduce useless flow from wasting fixtures and leaks to a minimum.

(To be continued)

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Contributions suitable for this paper, either in the form of special articles or as letters discussing municipal matters, are invited and paid for.

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Municipal Journal's Information Bureau, developed by twenty-one years' research and practical experience in its special field, is at the command of our subscribers at all times and without charge.

FILL THE RED CROSS RESERVOIR.

There is now in operation the largest water works system with the longest aqueduct the world has ever known. It is a dual system, there being two distribution systems, a double aqueduct three thousand miles long, and two impounding reservoirs.

The larger of the supplies is a high-pressure service used for extinguishing a fire that has broken out in central Europe and is threatening the world. It is also to be used for flushing out the Hun sewers, in which is dammed up a pestilential filth that, if released, will bring disease and death to liberty in every country. The firemen are going over by the tens of thousands every week, the hose is laid (some lines are already in service), and the larger reservoir has received from a recent shower more than three thousand million gallons.

The fire-fighters' work will be strenuous and their thirst will demand refreshing and heartening draughts of pure water. Also residents of the countries already overswept by the fire need such water—their parched lips plead for it and their own wells have been well-nigh drained by the long, exhausting draught upon them. Here in America is the most abundant supply available of pure Liberty spring water, issuing from millions of springs throughout the land. From these this second supply must come. Their contributions will be collected in Red Cross reservoir. That reservoir needs now one hundred million gallons at least. If more flows into it, flash-boards will be set on the spillway and all will be impounded.

I and you, every one of us, are the springs, and we must fill that reservoir and keep it full. If leaves of indifference choke our outlets, clear them away. Let's make them put on flash-boards to the limit!

FILL THE RED CROSS RESERVOIR!

ELECTRIC THAWING OF SERVICES.

An interesting question of policy is raised by Superintendent McReynolds in the article in this issue describing thawing services and hydrants at Colorado Springs. Should a water department or company thaw services by electricity or other method that does not require digging them up, or encourage consumers to do so? Mr. McReynolds thinks not.

His reason is easily understood. A service that freezes once is likely to freeze again unless conditions change. This is evident to any consumer. The changes in condition that will prevent freezing are generally confined to two—giving more cover to the pipe so as to get it below the frost line, and keeping the water running. The latter is the cheaper and easier to apply and is the one that the consumer is most apt to employ, especially if on a flat rate. But it is one that all superintendents wish to discourage unless the supply is unlimited and by gravity, and the mains are abundantly large to permit this without objectionably reducing the pressure and the amount of water available for fire. Such supplies and distribution systems are comparatively few.

This being the case, he would discourage the adoption of this alternative by encouraging or requiring the other. If a trench has been dug down to the service to thaw it out, there is comparatively little more work or expense involved in making the trench deeper and lowering the pipe. If it be lowered enough, the danger of freezing is removed for all time; for a pipe never freezes if the ground around it is not below freezing temperature. On the other hand, if a consumer can have his service thawed out at any time in a few minutes by electricity, and be fairly safe against freezing by letting water run all winter at no expense to himself, it will be difficult to persuade him to go to the expense of lowering his service pipe.

The matter is certainly worth serious consideration. Incidentally, it suggests that every water works' management in northern cities might require all services to be placed below danger of freezing. If any service not so placed should freeze, then, even though it be thawed by electricity, the water could be shut off from this service and kept off until the service had been lowered.

OIL AND TAR PRODUCTS AVAILABLE.

Information has been given out within the past few days by the Office of Public Roads and the Fuel Administration that petroleum, asphalt, or tar products wanted for the construction, maintenance, or reconstruction of roads will in future be delivered only after approval of the application by a committee representing the United States Fuel Administration and the Office of Public Roads of the Department of Agriculture. Notice to this effect has been sent to all state highway departments and these will be required to pass upon all applications for highway work in their territories in which the use of these materials would be required. The highway department will then forward applications approved by it

to L. W. Page, director of the Office of Public Roads, who is chairman of the committee that will consider the necessity that material of this kind be supplied and which in turn will make recommendations to the Fuel Administration, by which will be issued permits in accordance with these recommendations if the material is available.

It is estimated by the Office of Public Roads that more than a billion dollars worth of bituminous macadam roads in this country required asphalt, road binders, road oils, tar binders or dressings for their maintenance. It will be the aim in issuing these permits to prevent deterioration of these roads and at the same time to satisfy fully the fuel oil requirements of the army and navy, the essential war industries, and the Allies.

The United States is now being drawn upon to a constantly increasing extent for petroleum products, especially fuel oil, according to officials in the Oil Division of the Fuel Administration. The supply of bituminous products is so limited that it is requested that all new road construction involving these materials be deferred this year, except in cases where such work is necessary toward the winning of the war. Preference will be given to materials wanted for maintenance and repair work.

Forms on which all applications for petroleum, asphalt, or tar products for highway work must be made have been supplied to the state highway departments and additional copies may be obtained from the Office of Public Roads. These forms require detailed information as to the length, location, general uses and military necessity of highways to be built, maintained, or repaired.

TAR FOR BRIDGE FLOORS.

The use of tar for treating worn plank bridge floors was tried last year by G. F. Barstow at Stillwater, Minnesota, and J. T. Ellison, chief bridge engineer of the Minnesota Highway Department, has stated that the department is planning to adopt the plan this year for a number of timber and concrete bridge floors. This statement was made, and a description of the use at Stillwater was given by Mr. Barstow, at a meeting of the Minnesota Surveyors' and Engineers' Society a few weeks ago. The description given was as follows:

In the spring of 1917 it was necessary to replank the bridge across the St. Croix river at Stillwater, as the old planks had worn down very rough and in a great many places they were worn down as much as two inches. I figured that it would cost thirty-five hundred dollars to replank the bridge, which is seventeen hundred feet long. The planks will last from five to six years. The present planks were put on in the winter of 1910. I also figured on a creosoted block floor, but that would cost more than the city council wanted to put into it, as the bridge is a wooden structure and will very likely have to be rebuilt before many years.

While talking to the representative of the Barrett Co., he suggested that I surface the bridge with tar and gravel and explained to me the method and cost of doing so. After giving it considerable study I decided to try the experiment. The work was done in the following manner:

First we went over the bridge and filled in all the large cracks between the planks with lath and toe-nailed them to the planks, at the same time spiking down all loose planks. Then we took a small gasoline fire engine belonging to the city down to the bank of the river, pumped water and washed the floor of the bridge with the fire hose. As soon as the bridge was dry we went over it and gave it a priming coat of Tarvia B, which penetrated into the planks about one-half an inch. As soon as the Tarvia B was all absorbed by the planks, we give it a coat of Tarvia A heated to 125 degrees F. and immediately covered this with gravel which had been run through a one-inch screen. The gravel covering was done in the same manner as on the streets except that we had to pile at the ends of the bridge and haul it onto the bridge and spread it with shovels from a wagon.

As soon as the gravel had been spread, the bridge was opened to traffic and after about ten days the second coat was applied in the same manner. In another ten days we applied a third coat and this completed the job. Nearly all of the unevenness of the planks was taken out and now we have a fairly smooth floor and there is no wear at all on the planks. I examined the bridge during the warm weather this month (February), when there was no snow on it and found the coating as good as it was last fall, not any of it having scaled off.

I intend to give the bridge one more coat this summer and expect to take all of the unevenness out of it. On this summer's work on the bridge I will cover the tar with crushed rock chips that have been run through a half-inch screen and have also had all of the dust screened out of them. This rock is crushed nigger-heads that was screened out of our gravel pit.

The entire job cost five hundred and sixteen dollars and eighty-nine cents, or about nineteen cents per square yard. I figure that, if we give it one coat every year to keep it up, it will cost less than half as much as replanking every five or six years and we will always have a good, smooth floor on the bridge. The planks are also well protected from the moisture and will last for a good many years before they decay.

WOOD BLOCK BRIDGE FLOORS.

In a paper under the title of "New Features in Brick, Wood Block and Stone Block Pavements," Clifford Older, state highway engineer of Illinois, gave before the American Road Builders' Association the following experiences in the use of creosoted wood blocks for bridge floors:

Having had some experience with creosoted block floors on highway bridges, a few points learned by experience may be of some interest. In such construction it is of prime importance that the foundation, or sub-floor on which the blocks are laid, be sufficiently rigid so that, acting in conjunction with the cushion, it will not deflect enough to leave the blocks poorly supported. Otherwise the blocks will split under the traffic. As slight deflections of the sub-floor are inevitable, a somewhat plastic cushion should be interposed between the blocks and the sub-floor in order that the bearing of the blocks may become adjusted to the deflection of the sub-floor under the average traffic. The greater the live load deflection of the sub-floor, the greater becomes the need of plasticity in the cushion.

In the practice of the Illinois Highway Department, a sub-floor of creosoted plank 3 inches thick is laid on stringers spaced from 2 to 2½ foot centers. This is mopped with bituminous material and covered with a ¼-inch layer of bituminous felt. The felt is then coated with bituminous material and the blocks immediately laid. One-eighth-inch joints are provided as well as a one-inch expansion joint along the curb. A plain sand cushion should be avoided, as the vibration of the bridge is sure to cause it to shift. A cushion of bituminous material and sand would probable be satisfactory, if laid with proper care, but this expedient has not been tried by the writer.

The WEEK'S NEWS

State Highway Developments in Idaho and Michigan—Indiana's Highway Law Declared Invalid—U. S. Public Health Service Inspects Schools—New Water Mains for Washington—Pasadena Leases Power System—Big Munitions Explosion Near Pittsburgh—Capital Issues Committee Begins Operations—City Manager Plan for Roanoke—Six-Cent Fares for St. Louis—U. S. Shipping Board Investigates Transportation—War Department to Build $40,000,000 Supply Base in Brooklyn.

ROADS AND PAVEMENTS

State Funds May Not Be Invested in District Bonds.

Boise, Ida.—Interest money derived from the state's endowment funds cannot be invested in highway district bonds, according to the attorney general's office in an opinion written for the state land board. It is provided in the constitution that the educational funds may be invested in mortgages on improved farm property in the state, state, federal and school district bonds and in state warrants. At the twelfth session of the legislature the law was amended and the land board was authorized to buy highway district bonds. "It is our view that the constitutional enumeration of securities is exclusive," said the attorney general, "and that the legislature is powerless to add to or subtract therefrom, but that a constitutional amendment is necessary to warrant investment of the educational trust funds in highway district bonds." The attorney general said he did not question the advisability of investing the educational funds in the highway bonds if the law would permit. Two highway districts in Idaho county had expected to sell bonds to the state, but the attorney general's ruling will force them to seek a new market.

State Highway Law Declared Invalid.

Indianapolis, Ind.—Indiana's state highway commission law, passed at the last session of the legislature, and which was regarded as one of the most important measures enacted, has been declared unconstitutional by judge Cloe, of the Hamilton county circuit court at Noblesville. The action was taken in overruling a demurrer filed by the state against a suit questioning the validity of the act, which was filed by Robert House, a wealthy farmer living in that county. The defendants in the proceedings were L. H. Wright, chairman of the state highway commission, and its other members, together with Otto L. Klauss, state auditor. While the case can now go to trial on its merits, it is understood that this course will not be followed by the state, since the ruling of judge Cloe on the demurrer indicates what his final decision would be. Instead, it is expected that the defendants will appeal at once to the state supreme court. The ruling has attracted attention all over the state, because it has a direct bearing on all of the state roads which the commission has planned to build during the next two or three years. It is thought that nothing will be done on these state highways in the face of this ruling, until there is a decision from the higher court. Judge Cloe said in part: "The power to tax is within the grant of the legislative authority, and there can be no delegation of that authority, except to the extent of which it is necessary that taxes shall be levied under legislative authority by the various municipal bodies within the state for the purpose of carrying out the ends for which such municipalities are organized; and the power of the legislature in matters of taxation is unlimited, except as restricted by the constitution; and the legislature, in the exercise of its power in making local improvements, may create a special taxing district without regard to the boundaries of counties, townships or municipalities. Under the law in question, it is contended by the plaintiff that the state legislature has no power to create a taxing district, as contemplated by said law; that the district should be all the counties through which said proposed main market highways have been designated, and that all of said counties should constitute the taxing district, and should not be subdivided into a lesser unit, that is, each county within itself.

"The supreme court of Indiana has held, at different times, that the state legislature had the power, and in the enactment of certain laws, to grant and fix certain territory or territories as a taxing district for the making of public improvements or local improvements. Board of Commissioners of Monroe County vs. Harrell, 147 Indiana, 500.

"Again, it is earnestly contended by plaintiff that the commission highway law provides for special assessment to raise funds for the construction of highways, and it is equally contended by the attorney-general, in support of his demurrer, that the tax levied by the state and by the various counties, through their proper officers, is not an assessment for benefit of property, or a special assessment, but is a general tax.

"A special tax is a tax levied by the taxing authority for a special purpose, and, as stated by the attorney-general in his brief, a taxpayer can demand only two things: First, that it be expended for a public purpose; second, that it be of some benefit to him. There is a difference between general taxation and assessment. An assessment, as held by the various courts, is a tax levied upon abutting property owners in proportion to the benefits derived from the improvement.

"I think, in accordance with the opinions of the judges of the various courts in the decisions that have been cited, that no question can arise but what the improvement of public highways is of some benefit to the taxpayer of the taxing district. The question goes to the taxpayer, to what extent is his property benefited, and whether or not he is entitled to say or have a notice thereof.

"There are numerous decisions in the United States courts upholding the right to create taxing districts for public drains and for public highways, but in each case cited in the United States supreme court, provision was made for hearing and notices to the various property owners within said taxing district, and especially was it true in the case of Embree vs. Kansas City Road district, 240 United States reports 242. In view of the decisions referred to, and the numerous ones cited and read, the court is of the opinion that some notice is necessary to the taxpayer, and that some limitation of the amount of indebtedness or tax levy to be made should be stated."

Plan Convict-Built Concrete Road.

Lansing, Mich.—If the next legislature will approve a plan outlined by the Michigan Penology commission at a recent conference held in Grand Rapids, a concrete highway extending from Grand Haven to Detroit will be constructed within the next two years. By employing convicts from Ionia reformatory, Jackson prison and the Detroit house of correction, it is claimed by state highway commissioner Frank Rogers that the cost of construction of an 18-foot concrete road could be reduced to $25,000 per mile. Warden Otis Fuller, head of the Ionia reformatory, who has had recent experience in utilizing convict labor on highway construction, believes that the state highway commissioner's estimate is too high, and he declares that in spite of the increased cost of materials the cost per mile should not exceed $18,000. From Detroit to Ypsilanti, concrete has already replaced gravel with the exception of a few miles. It is proposed to extend the concrete highway from Ypsilanti through Jackson, Lansing, Ionia and Grand Rapids to Grand Haven. Seventy trusties from Ionia can be spared from the prison farm and the other industries and will be available for road work if the legislature will provide the funds to meet the amounts which will be raised by the various counties through which the proposed concrete trunk line will pass. Acting warden Frensdorf believes the members of the board of control of Jackson prison will look with favor on the proposition, and he estimates that at least 150 men could be spared from his institution for this important work.

SEWERAGE AND SANITATION

Bureau of Health Instruction Discontinued.

Toledo, O.—The city's Bureau of Public Health Instruction has been discontinued on the recommendation of the commissioner of health. The bureau was provided for in the ordinance passed by council in March, 1917. It was not actually established until May 15, when Joseph Kelsey was appointed director of the bureau in the recommendation of health commissioner Selby, by the board of directors of Toledo University. The university has financed the bureau since that time. Commissioner Waggoner's reasons for suggesting the abandonment of the bureau were that he could not make sufficient use of it to justify the employment of a full-time man. While he intends to use publicity to educate the public on health measures, he proposes to direct this work personally. Regular health bulletins, to occupy a specified place in the City Journal, are under consideration as a part of this plan.

Sewerage Improvements in Pennsylvania Towns.

Harrisburg, Pa.—The state department of health, during the month of April, issued the following permits and decrees for improvements to sewerage systems: Eldred, approving plans for a comprehensive sanitary sewer system and requiring detailed plans for sewage treatment works; Penn, approving plans for a comprehensive sanitary sewer system and sewage treatment works; Vandergrift, approving plans for an outfall sewer, sewage pumping stations and sewage treatment works; Throop, approving revised plans for a comprehensive sanitary sewer system.

School Inspection by U. S. Public Health Service.

Washington, D. C.—Medical inspection of school children is one of the activities now undertaken by the United States public health service to prevent the carrying of communicable diseases to the troops. Such inspection has already been commenced in practically all of the zones surrounding the army cantonments. An officer of the service is detailed to give his full time to the work and has an office and the assistance of school nurses or other help. The expenses, as a rule, are met jointly by the Red Cross, the local health authorities, and the public health service. Regular inspection of the work is carried on by a service expert familiar with the best standards of school hygiene. In but few of the places where this work has been commenced had school inspection been previously practiced and in none had the full-time services of a physician been devoted to it. Now, with a skilled officer giving his full time to the work in each locality, much is expected to be accomplished. In communities where school inspection has been adequately carried out, the result has been a remarkable reduction in the incidence of contagious diseases in the general population. The same result is expected in the areas around the cantonments. The plant is for the service office and nurse, through cooperation with the teachers, to keep a close watch on each school for the early detection of contagious diseases. The parents are then notified, the quarantine rules are enforced, vaccination is practiced where it fits the case, and all possible is done to prevent the disease from reaching the cantonment. The protection of the troops is the great aim; but at the same time the other benefits to be derived from school inspection are not overloked. Thus, while all of the children in the areas around the cantonments are examined frequently for communicable disease, they are also to be examined at least once a year for physical defects. These defects tend to lower individual resistance and increase the susceptibility of a child to contagious diseases. They also retard intellectual development and prepare the way for degenerative diseases in later life. When the defects are found the parents are informed and urged to have them corrected. The great number debarred from the army and navy recently because of physical disability indicates that many such defects, which could have been corrected in childhood had they been known, remained uncorrected, with a resulting loss in national efficiency at this crucial moment. In the examinations every effort is made to consider the parents' wishes in regard to inspection of their children. Where a doctor's certificate is presented, the child may be excused from the physical examination. The nurses not only assist in making the examinations, but go to the homes, follow up cases of communicable disease, tell the parents how to prevent the spread of the infection, look up children reported as absent to see if they are sick, and give advice in regard to personal hygiene. Clinics are established wherever possible, in order to give the necessary operative treatment to needy children. Where such clinics are not feasible, an effort is made to arrange with local physicians for the treatment of such cases. An attempt is also made to determine cases of defective or retarded children, so that they may be given special instruction fitted to make them useful citizens. Encouragement is also given to the teaching of personal hygiene in the schools. Furthermore, the sanitary conditions of the schools themselves are looked into, and the school authorities are given advice as to improvements in toilet arrangements, heating, ventilation, humidity, illumination, size of desks, playgrounds, etc. These features, and in fact all of the work, are conducted with a view to interesting nearby localities in school inspection. It is recognized that to effect any great improvement in the sanitary conditions of the country it is necessary to educate the school children in regard to the principles underlying public health.

WATER SUPPLY

Leak Survey Saves Pumpage and Coal.

Buffalo, N. Y.—Water commissioner George C. Andrews has reported to commissioner Kreinheder of the department of public works that during April water pumpage was reduced millions of gallons with a saving of 415 tons of coal, which means an economy of $1,850. The pitometer experts have been at work searching for underground leaks which do not show on the surface of the streets and have found in Wyoming avenue leaks which discharge 265,000 gallons of water every 24 hours into a sewer. Two broken curb cocks and a faulty hydrant which had been covered over in repaving caused those leaks. They have been repaired.

Water Shortage When Landslide Breaks Main.

Sheridan, Wyo.—This city faced a serious water famine when the greater supply of the city was cut off by a break in the main inlet pipe caused by a landslide. All four of the big reservoirs from which the water supply is drawn were absolutely empty and in many homes not a drop of water could be secured. Except for the chemical in case of fire, the department was absolutely helpless, as a pressure of from 60 to 80 pounds is necessary for working the hose effectively and only 15 pounds was registered at the station. The landslide occurred on the hillside of Rapid creek and the pipe broken was a 12-inch line that supplies the new reservoir southwest of the city. As soon as the break was reported a big gang of workmen was hurried to the trouble, the valve at the head of this line was shut off and the work of making repairs at once began. All the water that reached the city came through the old 8-inch pipe line that leads to the reservoirs northwest of town and the overflow from the fort line.

Rush Work on Water Mains in Capital.

Washington, D. C.—President Wilson recently issued an executive order declaring the construction of water mains on a number of streets in the city to be an emergency and waiving the eight-hour work law on the jobs. Congress at the end of last March passed an urgent deficiency bill providing $70,000 for 24-inch mains on a number of streets, and $66,700 for 12, 16, 20 and 24-inch mains on others. According to the President's order, "these water mains are to be constructed for the convenience of office buildings erected by the United States government in this vicinity in connection with work relating to the present war, and the

commissioners of the District of Columbia have requested that this be declared an emergency matter, and have asked that the eight-hour law relating to the employment of laborers and mechanics in the District of Columbia be waived in connection with the construction of these water mains." Pay will be allowed to those entitled in the construction of the mains with compensation of time and a half for overtime work.

STREET LIGHTING AND POWER

Commission Refuses Surcharge.

South Bend, Ind.—The Indiana and Michigan Electric Company of South Bend will not be permitted by the state public service commission to add a surcharge to its electric rates in South Bend, Mishawaka, Elkhart, Lakeville, Osceola, Rolling Prairie and other northern Indiana towns. The commission found that the company is making 8 per cent on its value and that no surcharge petition was justified. It found also that the company supplies current "at less than cost" to large consumers and that therefore the small or average consumer has to contribute just so much more to pay the big consumer's bills. A revision of this rate schedule is advised. It was found that the company was entitled to a rate-making basis of $6,243,907.13. This figure includes $200,000 allowed the company for "intangible values and working capital." The remainder is the property value of the plant and system as based on the company's valuation, made by the commission in 1914 and brought down to date by the present commission.

City Leases Power System.

Pasadena, Cal.—The city and the Southern California Edison company have concurred in an agreement after long discussion by which the city is to lease the power distribution system owned by the company within Pasadena for a term of two years. The lease must be approved by the State Railroad Commission. The value of the system agreed upon is $513,102.11. The city undertakes to pay an annual rental equal to 8 per cent and to pay at the same rate for extensions. Besides this, the city is to pay a sum equal to 3.36 per cent of the system's value on account of depreciation, these payments to be set aside in a depreciation reserve fund under certain specified conditions. The city will hold an option to purchase the company's distributing system in Pasadena at the price stipulated plus cost of additions thereto at the end of the two-year period. If the war still continues at the end of two years, then the lease may be extended under the same terms and conditions until the end of the war and for four months thereafter. The city agrees to purchase from the company at all times during the term of the lease such electrical energy as it may require, and at the termination of the lease, provided that the city acquires the company's distributing system, to continue purchasing all its electrical energy from the company until April 15, 1933.

The schedule for energy supplied by the company to the city is to be: For the first 250,000 kw.-hr. furnished during each month, 0.95 cent per kilowatt-hour; for the next 500,000 kw.-hr. furnished during each month, 0.90 cent per kilowatt-hour; for all over 750,000 kw.-hr. furnished during each month, 0.75 cent per kilowatt-hour.

The city is to have the right, upon giving thirty days notice, to take service upon an annual load-factor basis, the load factor being figured upon an average of the three highest peaks in a year, no two peaks being in any one month. The load-factor schedule is:

	Cts. per Kw.-hr.
Less than 44 per cent load factor	0.875
Less than 46 per cent but not less than 44 per cent.	0.85
Less than 48 per cent but not less than 46 per cent.	0.84
Less than 50 per cent but not less than 48 per cent.	0.82
Less than 52 per cent but not less than 50 per cent.	0.79
Less than 54 per cent but not less than 52 per cent.	0.77
Fifty-four per cent and over	0.75

The steam plant of the city, with a rating of 6,000 kw., which now supplies electrical energy to the city's distributing system, will be maintained by the city and kept in condition for operation, but will be operated only upon the order of the company or when and during the time the service of the company to the city shall be interrupted and the operation of the plant reasonably necessary. Whenever the plant is operated the company is to pay all costs incident to putting it in operation and maintaining it during the period required, including interest and depreciation at the rate of 12 per cent per annum for said period on the depreciated value of the plant as carried upon the books of the city. During the period of the lease the provisions of the agreement will be carried out under the supervision of an "operating board," to consist of the manager of the city's electric department and a representative of the company.

The city agrees to lease and sell to the Edison company certain distribution lines belonging to the city outside the limits of Pasadena under the same terms and conditions as the Edison company's lines in Pasadena will be leased or sold to the city, and further agrees to confine its electric distributing business in future to the territory within the corporate limits of Pasadena, certain specified existing consumers outside the city excepted. During the term of the lease all additions and new business secured by the city are to be attached to and become a part of the respective systems of the city and the company in such manner and quantity that the new business and extensions measured in income will be so distributed that the present proportion of business as between the company and the city is at all times substantially maintained. The distribution of such extensions and new business will be subject to the operating board. The present proportion between the city's business and the company's business is determined as 56 to 44. The testimony submitted at the hearing before the commission indicated that Pasadena could make great economies in operation by the consolidation of the Edison company's Pasadena business with that of the city. No rate reductions were promised by the city in the near future. The Edison company will be a gainer by the agreement in that it will earn 8 per cent on its local investment instead of less than 5 per cent under existing conditions, and that it will supply a total of over 12,000,000 kw.-hr. annually to the territory within the city, instead of approximately 5,000,000 kw.-hr. as at present. Since December, 1917, the city of Los Angeles has been supplying Pasadena with some electrical energy, this being surplus energy from the aqueduct plant over and above that required by Los Angeles under its contract with the Edison company. At the hearing before the Railroad Commission in reference to the joint application of the city of Pasadena and the Edison company, the city attorney of Los Angeles entered a protest against the discontinuance of power service to Pasadena by Los Angeles which would follow the approval of the joint application made by Pasadena and the Southern California Edison Company. The existing contract between Los Angeles and Pasadena for surplus electrical energy contains a provision that it may be abrogated upon thirty days' notice by either. According to the attorney for Los Angeles, the protest was made along the lines of patriotic conservation. He stated that Los Angeles did not desire to embarrass Pasadena in the matter of its agreement with the Edison company, but that if the power service of Los Angeles city to Pasadena were discontinued, the Edison company would have to supply an equal amount of energy generated by steam. This statement was refuted by representatives of the company.

Company Must Make Extension.

Dover, N. J.—Describing as "absolutely indefensible" the position of the New Jersey Power & Light Company of Dover in refusing to make any extensions unless they are paid for by the persons desiring them, the state public utilities commission has ordered the company to extend its electric service to supply the house of a resident of Kenvil. After showing that the company had not hesitated to spend large sums of money for the purpose of generating electric current for the Wharton Steel Company, with which it has a profitable contract, the board added the following comment: "It would seem that when the contract for service is unusually attractive, the company has no difficulty in financing it, but when an extension involving the small sum of $90 is required, affording a return of between six and eight per cent net, it is not interested." The case was somewhat aggravated by the fact that before wiring his house for electric current, the consumer had

obtained a promise from the company that the small extension necessary would be installed. This promise was made in the spring of 1917, but the company delayed making the extension from time to time. It finally refused point blank to make the extension unless the consumer paid for it, the understanding being that the company would refund in instalments at the rate of fifty per cent of the annual revenues derived from the extension.

FIRE AND POLICE

Forest Fire Causes Big Loss.

Westport, Me.—A forest fire which swept over the southern end of Westport, an island town in the Sheepscot river, was finally gotten under control after causing damage estimated at $200,000. The residents who had fought all night to keep the fire from spreading to the more populated portion of the island and endangering more than a hundred homes, were kept busy extinguishing the flames as they broke out anew at different sections of the fire zone. The greatest loss was on the summer cottages along the shore, which were owned mostly by residents of other states. Of 24 buildings burned, two-thirds were cottages, valued at from $3,000 to $15,000. Heavy losses to pine and spruce timberland also were sustained. The fire, believed to have been started accidentally by a match dropped by a workman engaged in setting up a portable sawmill, spread from the west to the east end of the island and burned toward the southern end, the wind carrying the flames away from the main part of the island. It covered territory three miles wide and four miles long.

More Than Hundred Killed in Munitions Explosion.

Oakdale, Pa.—Ninety-one bodies had been taken from the ruins of the Aetna Chemical Company's plant by the end of the third day following terrific explosions which wrecked the plant. At that time company officials said that 190 members of the working force of the plant were yet unaccounted for. The work of searching the ruins was halted by heavy rain, which, falling upon the acid-covered ground, caused deadly fumes to rise from the wreckage. Nine explosions wrecked the explosive manufacturing plant, which is sixteen miles from this city. Throughout the night and day following the catastrophe men were extinguishing small fires in the debris and were bringing out remnants of human bodies. In most cases there was nothing to identify the victim. While earlier explosions wrecked the plant, the last one blew the piles of debris clear of the ground and scattered them over more acreage than before, blackening everything beyond recognition. All during the first day after a brown smoke continued to hang over the ruins, considerably impeding the work of the searchers. For a time the work was impeded further by the thousands of sightseers, who flocked to the scene from the surrounding country. Automobiles blocked all roads to and from the place, and another company of the state constabulary was rushed in automobiles from Greensburg to establish a greater cordon about the scene of the disaster. The crowds were ordered back, and automobiles were turned back when they had reached within five miles of Oakdale. Later a complete cordon encircled the plant a mile and a half, and only those having business were admitted past the guards. Thousands of persons streamed into the temporary morgue all day to view the bodies, and it took a special detail of police to keep this morbid element in check. The country is desolate for an area of several miles around the plant, where the former green hillsides have been seared and burned by the blasts. The meadows and fields have been seared, and fruit and shade trees have been blasted and denuded of their foliage. The five hundred workmen were startled at noon by a report not much louder than the crack of a pistol. It came from the soda house, but they knew its deadly import and rushed for the nearest exit. Before they could gain the open the air seemed to burst into flame, the earth heaved and rocked, and with a roar that was heard for miles the long factory buildings were hurled into the air, carrying with them heavy equipment and scores of men. Many of the injured, some of whom were found half a mile from the remnants of the factory, were taken to Pittsburgh hospitals by special train and in ambulances in the afternoon and in the early evening, all of them so badly hurt that in only a comparatively few instances were physicians able to hold out any hope for their recovery. The property loss was estimated at $1,500,000. Immediately after the second explosion the mass of broken beams and twisted timbers broke out in a great blaze, while the highly inflammable chemicals used in the manufacture of the factory's deadly products—T N T and T N A—added ample fuel to the flames. Blast after blast followed as the heat reached the tanks, each one scattering the burning embers and endangering property in the entire community. Telephone and telegraph wires were wrecked by the explosion, and the tracks of the Panhandle railroad were blocked by ruins. With the first call for hospital aid and ambulances went a corps of nurses and physicians from St. Johns Hospital. One of these nurses, Meryl Aschelman, New Philadelphia, O., was acting as a stretcher bearer. A blast threw her to the ground and the patient on the stretcher was killed. Miss Aschelman lost one leg.

Four Firemen Killed in Collision with Car.

Vancouver, B. C.—Four city firemen were killed and one injured when a hose wagon, traveling at a high rate of speed while responding to a fire, struck a street car. The six passengers aboard the street car were uninjured. The dead are: Capt. Jack Frost, driver Otis Fulton, pipeman Colin MacKenzie and pipeman Donald Morrison. Pipeman Torquil Campbell was injured.

Firemen Injured in Lumber Yard Blaze.

Omaha, Neb.—Assistant fire chief Dineen and eleven firemen were injured, and several more were overcome by smoke in a raging fire, which spread through the Gross Lumber and Wrecking yards, burning over four adjoining residence blocks. More than a score of houses were totally or partially destroyed. The loss is estimated at $150,000. The direct cause of the fire has not been learned. It is believed it started from sparks emerging from a cupola of the Nebraska Foundry and Manufacturing Company, which settled in heaps of refuse in the rear of the wrecking yard. Every piece of fire apparatus in the city was at the scene. A brisk south wind aggravated the leaping flames, and they spread quickly to thickly congested houses in adjoining blocks. Within one hour the lumber and wrecking yards were totally devastated. Several houses three blocks away caught fire from burning fagots. Telephone and electric light wires within a radius of four blocks were down. While fire engines pounded furiously to increase water pressure more than thirty streams of water were poured on houses newly afire. So high was the gale that for a time it was feared the firemen could not gain control. Chief Salter was on the scene immediately following the first fire alarm. The second alarm was turned in twenty minutes later, followed by a third. Firemen from Benson and South Omaha were detailed to fire barns in the loop in order to be in readiness for emergency work.

GOVERNMENT AND FINANCE

Capital Issues Committee Begins Work.

Washington, D. C.—The War Finance Corporation, created by Congress at the request of Secretary McAdoo to finance war industries and limit and control investment of capital during the war, is now officially in existence, the directors and officers having been sworn in. The corporation has for its chairman of the board of directors Secretary McAdoo; as vice-chairman and general manager, W. P. G. Harding, governor of the federal reserve board, with Sherman Allen, formerly assistant secretary of the

treasury and now assistant secretary of the federal reserve board, as treasurer and secretary pro tem. The board of directors, in addition to Messrs. McAdoo and Harding, consists of Clifford M. Leonard, Eugene Meyer, Jr., and Angus W. McLean. The members of the capital issues committee, which is to regulate investment of capital during the war, consists of Charles S. Hamlin, designated as chairman by President Wilson; John Skelton Williams, controller of the currency; Frederick A. Delano, of the federal reserve board; James B. Brown, John S. Rum, Henry C. Flower and Frederick H. Goff. The federal reserve banks will continue to finance business and industry; the function of the War Finance Corporation is to finance the investment banking of the country. The functions of the banks and the corporation are complementary, and full co-operation may be expected. The War Finance Corporation will start business with a capital stock of $500,000,000, all subscribed by the United States Government, and will have authority to issue bonds to the extent of $3,000,000,000 with which to finance its operations. The corporation will make loans to banks and trust companies making loans to finance "operations necessary or contributory to the prosecution of the war." These loans will be made for periods not exceeding five years and in sums not more than 75 per cent. of the face value of the loans made by the borrowing banks to finance "operations necessary or contributory to the prosecution of the war." The notes of the borrowing banks taken by the corporation for these loans will be secured by adequate collateral. The corporation may also make loans to savings banks and building and loan associations under certain circumstances, and may in some cases make loans direct to industries essential to the war.

The capital issues committee of the federal reserve board announced that the number of applications considered during the week ending May 11 was greater than in any previous week of its existence. The committee determined thirty-seven cases, aggregating $27,487,277.56, of which $4,811,000 were disapproved. In addition to the amount formally disapproved, postponement for the period of the war was secured informally of issues aggregating $4,990,000. The $22,676,277.56 approved included $6,777,084 of refunding obligations, so that the new issues approved aggregated $15,899,193.56. New issues for the corresponding period last year amounted to $14,196,500. The committee stated that spread of the knowledge of its aims and purposes continued to be reflected in voluntary postponement of security issues, the case being cited of the city of St. Louis, Mo., which has adopted a policy of financial preparedness consistent with the national welfare. The city has notified the committee that it is going ahead with securing local authority to create certain debts and advertising the issues of bonds therefor so that they may be marketed readily at the proper time, but that it will submit for approval by the committee only such issues as are for urgent and essential purposes. The city is at present advertising some $14,000,000 of bonds, which it does not purpose to market until the conclusion of the war. Other municipalities in federal reserve district No. 8 are adopting the same patriotic course. The Milwaukee member of the sub-committee of the Chicago federal reserve district reports that the city of Milwaukee, in bringing its needs into conformity with the national interest, has reduced presently contemplated bond issues from $5,740,000 to $1,050,000.

Tiny City to Disincorporate.

Coram, Cal.—This city, the tiniest in California, for it has only thirteen registered voters, has called a special election for May 28th to vote on the proposition of disincorporating. The city has been in existence for eleven years. It has never levied a tax and it is out of debt. It was with considerable difficulty that enough citizens could be rounded up to serve on the election board. Of the five trustees supposed to be on the board one is dead, one is in a state hospital, two have moved away. The only one left called the special election. The main reason for disincorporating is that it is too much trouble to make out the annual reports required of all municipalities by the state controller.

Voters Approve City Manager Plan.

Roanoke, Va.—Roanoke has adopted the commission manager form of government to replace the bicameral councilmanic form. The majority voting in favor of the change was 734. A commission will be elected June 11, and the city's government will pass into new hands September 1.

TRAFFIC AND TRANSPORTATION

St. Louis Car Fare Six Cents.

St. Louis, Mo.—Beginning June 1, street railway fares in this city will be six cents, the state public service commission at Jefferson City having granted the raise by a vote of three to two, to the United Railways. The rate will continue for one year unless it is changed by a subsequent order of the commission, or by an appeal by the city of St. Louis to the courts. Universal transfers will be issued, as at present, without additional cost. Half-fare tickets will be sold at the present rate of 2½ cents each. The company is required to place tickets on sale at convenient points throughout the city, in blocks of five, ten and 100 individual fares. The majority opinion and order concerns two main points. The first is whether the commission has the authority, under the constitution, to act in the case, and the second is whether the United Railways operating with the present fares would be able to meet its operating expenses, pay its debts and grant a wage increase to its employees. On the question of jurisdiction the opinion holds that the commission has the power to act and cites authorities. In considering the second point, namely, the inadequacy of the fare that has been in effect, the financial and physical condition of the property, as shown by the reports of city engineer Smith, officials of the United Railways and experts of the public service commission, is analyzed and the conclusion is reached that the revenues of the company, on the present basis, would be insufficient during the coming year, especially in view of the fact that no relief would be afforded by the so-called compromise franchise ordinance recently passed and approved, within the year that the fare increase is to remain in effect. The company is ordered to make monthly reports to the commission, showing its gross earnings and operating expenses under the new system. The commission retains jurisdiction of the case, and may change the fare schedule after its engineers and accountants complete a valuation of the property. The commission has determined to make such a valuation during the coming year. In the present case the commission took $52,800,000 as the value of the property.

Federal Investigation of Shipyard Transportation.

Washington, D. C.—The United States Shipping Board recently assigned A. L. Drum to direct a survey of transportation conditions in the population areas serving the eastern shipbuilding plants with a view to improving and extending the local passenger transportation facilities so as to serve the employes now at work. It was also to determine the extent and reduce as far as possible the expenditures for new housing for the shipyard forces. Traffic surveys and plans were made for improving the transportation facilities for twenty-eight shipyards now employing 70,100 men and requiring an increase of 67,000 men. At these shipyards and the adjacent war industries 96,400 men are employed. Altogether it is estimated men required to be engaged on the work of ship building and adjacent war industries work will be nearly 200,000 at the following locations: Savannah, Newport News, Baltimore, Sparrows Point, Camden, Gloucester, Newark Bay, Staten Island, Newburgh, N. Y., Port Jefferson, L. I., Fore River and Squantum at Boston, Portsmouth, N. H., Groton and Bath, Me. The survey revealed that most of the shipyards re-

quiring additional housing were on marshy land and subject to unhealthy conditions, and that it was necessary to locate any new housing a mile or two distant from the yards and consequently requiring electric railway or steam railroad transportation for the men. It was found that at many plants some new housing would be necessary. Permanent houses will usually require local transportation and will cost on an average of $1,500 per man for the houses. For barracks located near the shipyards the cost is about $350 per man. Estimates show that where about two miles of track extension are necessary from existing lines to the shipyards and a full complement of cars, substations, feeders and carhouses is required the investment averages about $150 per man to be transported. According to these statistics the investigators were convinced of the economy of developing existing transportation facilities over the making of large investments in temporary or permanent housing, even if the extension were afterwards abandoned, because the cars and power supply, representing less than one-half the investment for even barracks would be available for future use. The whole development planned includes increasing ferry boat service with existing boats, increasing steam railroad service with existing rolling stock, and making electric railway extensions and adding cars and power supply at a total cost of about $9,000,000. This includes $2,400,000 to be provided by the Pennsylvania Railroad and the Hudson & Manhattan Railroad for extending the Hudson Tube service to the Lincoln Highway at Port Newark, N. J., where it will serve 50,000 men. After planning to utilize the existing housing to its utmost capacity by improving the transportation facilities the next effort was to permit the use of these transportation facilities to their fullest extent by spreading the shifts at the shipyards from one hour to one hour and one-half in order to secure two round trips in the morning and evening with each car in the service. The management of the shipyards are now working out plans for spreading their shifts an hour and thirty minutes.

Strike May Lead to Six-Cent Fare.

Rochester, N. Y.—After a three-day strike, the motormen and conductors employed on the lines of the New York State Railways in this city returned to work. The men had been offered an advance in wages of 4 cents an hour, but they refused. They accepted the offer, however, after the tie-up. It was also stipulated by James F. Hamilton, vice-president and general manager of the company, that if the Rochester municipal authorities allow the company to increase its rate of fare from 5 cents to 6 cents, an additional wage increase will be granted. The men were receiving a sliding scale of 27, 29 and 31 cents an hour according to the length of time they had been in the company's service. They demanded a wage increase to 40, 42 and 44 cents an hour. The company said it was unable to pay this, and Mr. Hamilton has offered to submit the company's books, records, etc., to the city to show that it cannot operate at a profit and pay the men higher wages with a 5-cent fare. This investigation is under way by the city authorities. About 1,300 men were involved in the strike. The company admitted that the men should have more money, but told them that the company was not in a financial condition to pay a higher wage. The company announced that a 4-cent an hour increase would be granted to the platform men, retroactive almost nine days. The men, however, agreed to strike and left the thousands employed in war industries without transportation facilities. The company made no effort to run cars and there was no disorder. After a series of conferences between representatives of the men, the federal war department, the municipal authorities and the company, the men agreed to return to work under the original offer. In addition to the wage advance, the regular run men are guaranteed ten hours' work each day. Other changes in working conditions are subject to arbitration between the company and the men. M. & L. W. Scudder, New York, accountants, have been engaged by the city to investigate the financial condition of the company. While there is much opposition to the 6-cent fare, it is thought that it will be granted if the report of the accountants is favorable to the company.

MISCELLANEOUS

Research Bureau's War Service.

Philadelphia, Pa.—For several months the Bureau of Municipal Research of this city has been operating a "war information booth" in the city hall court yard. An attractive pavilion, located at the crossing of the city's two principal streams of foot traffic, is "manned" by a paid staff of intelligent young women who answer a large number of inquiries daily. The bureau found that there are so many recruiting stations, Red Cross and other relief offices, employment agencies and other centers of activity that the eager volunteer, the troubled mother and the war gardener are at a loss where to go for information. The information booth acts as a clearing house and directs such inquirers to the proper source, or else answers the query directly. Among the usual topics of inquiry are the following: War gardens, activities of various war organizations, home service, food economics, recent war legislation, foreign mail regulations, enlistment, employment, location of cantonments and shipyards, housing, casualty lists, etc. According to Sedley H. Phinney, acting secretary of the bureau, this service has proved a great conserver of both energy and enthusiasm, and is universally regarded as a real success.

To Build $40,000,000 Supply Base.

New York, N. Y.—It has been announced by the Turner Construction Company that it has obtained the contract for the erection of the supply base for overseas transportation, and that it will build for the War Department a freight and steamship terminal that will cost approximately $40,000,000. The new terminal will improve and enlarge the terminal facilities already in South Brooklyn. One feature of the plans is that it is proposed to erect the largest building, the company claims, that was ever built in the world. The plans for this and the other structures were prepared by Cass Gilbert, under the direction of General Goethals, Director of Storage, Transportation, and Purchase. The building is to have 6,000,000 square feet of fireproof floor space and will be approximately 1,000 feet square. It will take eight or nine stories to allow for this space under one roof, as the plan calls for the lighting of the building by one street and three courts. In addition to these housing facilities the plan includes also the construction of piers larger than any other in New York and capable of furnishing berthing space for the largest steamships in the world. There will be built here three double-deck, steel, concrete, and timber piers 1,300 feet long and 150 feet wide, together with a lighterage pier of 1,350 by 70 feet wide. This will be one story in height. About thirteen miles of railroad track will be laid down to serve the base, and it will take 150 elevators to handle the 1,000,000 tons of goods to be stored. It is stated that twelve 8,000-ton ships can be loaded in one day when the plant is working at maximum capacity. This project will, it is estimated, require 1,250,000 cubic yards of dredging. One of the objections advanced by those who have opposed the Goethals plan for improvement in South Brooklyn has been that the work could not be made ready for use in less than two years. The Turner Construction Company announced that it hopes to give the Government the partial use of the great building by the end of this year, and that the entire project will be completed by next spring. The work will be started at once, and it is planned to keep 7,000 men at work when under way. According to some opinions, the Brooklyn establishment will be built in the face of opposition expressed by the railroad administration and against the judgment of railroad and shipping experts in New York who insist that it will not be possible to deliver freight by rail or water sufficiently to fill the gigantic warehouses. The new base is intended to provide accommodations for shipments from the west and south, the situation in New England in the matter of military supply accumulation and distribution being met by the Boston plant. The railroad approach to the Brooklyn plant is described as inadequate and it is predicted there will be difficulties in handling material on the wharves.

NEWS OF THE SOCIETIES

CALENDAR OF MEETINGS.

May 27-June 1.—CANADIAN PUBLIC HEALTH ASSOCIATION. Meeting with Ontario Health Officers' Association, Hamilton, Ont. Secretary, J. G. Fitzgerald, Toronto, Ont.

May 27-29.—NATIONAL CITY PLANNING INSTITUTE. Annual conference, St. Louis, Mo. Secretary, Flavel Shurtleff, 19 Concress Street, Boston, Mass.

June 4-6.—INTERNATIONAL ASSOCIATION OF FIRE ENGINEERS. Annual convention, Chicago, Ill. Secretary, Chief James McFall, P. O. Box 1015, Washington, D. C.

June 4-7.—AMERICAN SOCIETY OF MECHANICAL ENGINEERS. Spring meeting, Worcester, Mass.

June 5-7.—NATIONAL MUNICIPAL LEAGUE. Annual meeting, New York, N. Y. Secretary, Clinton Rogers Woodruff, North American Bldg., Philadelphia, Pa.

June 13, 14.—NATIONAL ELECTRIC LIGHT ASSOCIATION. Annual meeting, Hotel Traymore, Atlantic City, N. J. Secretary, T. C. Martin, 33 West 39th St., New York City.

June 11-13.—MAYORS AND OTHER CITY OFFICIALS OF NEW YORK STATE. Annual conference, Newburgh, N. Y. Secretary, William P. Capes, 25 Washington St., Albany, N. Y.

June 19-21.—NATIONAL ASSOCIATION OF COMPTROLLERS AND ACCOUNTING OFFICERS. Annual meeting, Atlantic City, N. J.

June 19, 20.—LEAGUE OF TEXAS MUNICIPALITIES. Sixth annual convention, in cooperation with the Texas Commercial Executives' Association, San Antonio, Tex. Secretary, Edward T. Paxton, University of Texas, Austin, Tex.

June 24-26.—AMERICAN CONCRETE INSTITUTE. Annual meeting, Atlantic City, N. J.

June 25-28.—AMERICAN SOCIETY FOR TESTING MATERIALS. Annual meeting, Atlantic City, N. J. Secretary-treasurer, Edgar Marburg, University of Pennsylvania, Philadelphia, Pa.

June 26-28.—AMERICAN INSTITUTE OF ELECTRICAL ENGINEERS. Annual convention, Atlantic City, N. J. Secretary, F. L. Hutchinson, 33 West 39th St., New York City.

Oct. 2-4.—AMERICAN SOCIETY OF MUNICIPAL IMPROVEMENTS. Annual meeting, Buffalo, N. Y. Secretary, Charles Carroll Brown, 304 E. Walnut St., Bloomington, Ill.

National Municipal League.

One of the most important annual meetings ever held by the National Municipal League will take place June 5 and 6 in New York City in conjunction with the National Conference on War-Time Economy, called by the Academy of Political Science and the New York Bureau of Municipal Research. The plans were determined by the council of the National Municipal League at its semi-annual meeting in New York City, April 24, after a careful canvass of the whole situation. The Governmental Research Conference will meet at the same time and possibly some of the other organizations that have heretofore met with the league.

The program of the National Conference on War-time Economy includes a discussion of "War Economy and Financing Local Governments," "The Government as Employer," "The Need of a Budget," "The Duties of City and State Governments During War Times," "Executive Leadership in a Democracy."

The league's program will include the discussion of such questions as:

Federal Relations to American Municipalities.

War-Time Work of Civic Organizations.

What Are Necessary Municipal Improvements?

State and Local Government in the Light of War Necessities.

A Scheme for Legislative Leadership.

The City Manager Plan as a War Measure.

Reorganized Justices' Courts: An Essential to World Democracy.

The day sessions of the meetings of the National Municipal League on Wednesday, June 5, will be at Greenwich House, one of the leading social settlements in New York, of which the directress is Mrs. Mary K. Simkhovitch, a member of the council.

The tentative program of sessions is as follows:

Wednesday, June 5. 10 a. m.—Opening session, National Municipal League, Greenwich House. 10 a. m.—Governmental Research Conference, at New York Bureau of Municipal Research, 261 Broadway. 10 a. m.—Civic Secretaries' Conference, Greenwich House. 1 p. m.—Luncheon at Greenwich House for National Municipal League, Civic Secretaries. 1 p. m.—Luncheon at Greenwich House for Governmental Research Conference. 3 p. m.—Joint session, National Municipal League, Governmental Research Conference and Civic Secretaries, Greenwich House. 8 p. m.—Opening session of War-Time Economy Conference, Columbia University.

Thursday, June 6. 10 a. m.—Sessions of War-Time Economy Conference, Hotel Astor. 1 p. m.—Luncheon, Hotel Astor. 7 p. m.—Joint war-time supper at City Club, 55 West 44th street.

The first session of the war conference, to be held at Horace Mann Auditorium, Columbia University, on Wednesday night, will be devoted to "Executive Leadership in Democracy," and will be presided over by R. Fulton Cutting, chairman of the board of trustees of the New York Bureau of Municipal Research. After the introductory address and the address of welcome by President Nicholas Murray Butler of Columbia University, Frederick A. Cleveland, Industrial Service and Equipment Company, Boston, Mass., will discuss "Recent Growth of Executive Leadership." There will follow a "Symposium on Executive Responsibility for War Economy," in which governors Carl Milliken of Maine, Martin G. Brumbaugh of Pennsylvania, Frank O. Lowden of Illinois and Emerson C. Harrington of Maryland and other war governors will record briefly the war work of their respective state governments.

The second session, held in the Belvedere Room of the Hotel Astor, will deal with "War Economy in Financing Local Governments." The presiding officer will be Mortimer L. Schiff, of Kuhn, Loeb & Co., New York. The program will be as follows: "The Pay-as-You-Go Policy in New York

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PROBLEMS CITIES ARE STUDYING WITH EXPERTS

Monrovia, Cal., is making WATERWORKS improvements to cost $42,500. The consulting engineer for the work is W. S. Jones.

Two SEWAGE DISPOSAL PLANTS are to be built by Stockton, Cal., the consulting engineer for the work being F. H. Tibbetts.

DRAINAGE IMPROVEMENTS are to be made by Tunica, Quitman and Panola counties, the plans having been completed by the Morgan Engineering Co.

A SEWERAGE SYSTEM and SEDIMENTATION TANK are to be built by Shelbyville, Ky., plans having been prepared by the consulting engineer, Charles E. Collins.

In its controversy over the plan of the New York Railways Company to institute a six-cent FARE, the city of Rochester, N. Y., has retained the firm of accountants, M. & L. W. Scudder, to investigate the finances of the company.

Kirkland, Wash., is making STREET IMPROVEMENTS. The engineers for the work are the firm of Gardiner & Gardiner.

Belton, Mo., is to build a DAM and LAKE. The engineers for the work are the firm of Henrici, Kent & Lowry Engineering Co.

The SEWERAGE SYSTEM of Milford, Mass., is to be extended. The engineer for the improvement is Owen Barbour.

STREET IMPROVEMENTS are to be made by Ashland, Wis., plans and specifications for the work having been completed by the consulting engineering firm of Reichardt & Pierce.

McAlester, Okla., is to build a new SEWAGE TREATMENT PLANT and WATERWORKS to cost between $500,000 and $600,000. The consulting engineering firm of Burns & McDonnell has been retained to prepare plans and specifications for the improvements.

INDUSTRIAL NEWS

Cast Iron Pipe.—Cast iron pipe manufacturers are very concerned over their present inability to obtain enough pig iron to keep in anything approaching full operation. While some of them are doing a great deal of government business, most of them also are doing a larger percentage of general business or are furnishing pipe for purposes that are not considered strictly as "war work." The American Waterworks Association will send a petition to Washington, urging that cast iron pipe be placed in a preferred class as necessary for the preservation of the public health, particularly in towns which have been growing rapidly on account of war business, and find it necessary to extend their corporate lines and build many new houses. Government prices remain constant. Quotations: Chicago, 4-inch, Class B and heavier, $57.30; 6-inch, $54.30. New York, 4-inch, Class B and heavier, $58.35; 6-inch, $55.35; 3-inch, $65.35. Birmingham, 4-inch, Class B and heavier, $52; 6-inch, $49; Class A $1 extra.

The Pittsburgh Filter Manufacturing Company, Pittsburgh and Oil City, Pa., has started the publication of a monthly house organ, entitled "Shop and Field News," which is "devoted to the mutual co-operation and interest" of all associated in the business of the company. It is readable in style and chronicles personal items, events and opinions. The first issue also contains an illustrated description of the new filtration plant of Tulsa, Okla., recently installed by the company.

Government Price Fixing on Cement.—One of the most important recent developments in the construction industries is the announcement of the final arrival at a price adjustment between the government and the Portland cement manufacturers of the Lehigh Valley and Hudson districts. This quotation has been placed at $1.75 for Lehigh Valley, or Zone 1 production, and $1.85 for Hudson Valley cement. These levels represent an advance of 45 cents a barrel over the quotations formerly made on government orders, base Lehigh, prior to the development of higher cost of manufacture since this country went to war a little over a year ago. The new prices are 15 cents below the mill quotation for commercial business.

Simultaneous with this announcement comes word out of both districts that the coal situation is becoming easier and the threatened restriction of output does not now promise to be quite so acute. The larger construction programs outlined by the government and by the United States Steel Corporation have injected new factors into all classes of building materials, especially with relation to supply, and it is not at all improbable, in the minds of some interests, that a construction program running into the billions of dollars will draw so heavily upon the limited supplies of building materials on hand in the eastern part of the country that orders recently promulgated may have to be revised to permit husbanding of reserves adequate for immediate future requirements.

Army to Buy Small Trucks.—The purchase of commercial types of trucks for army use instead of the development of two smaller types of the Liberty trucks has been ordered by the War Department. It is understood that the manufacture of the large three-ton Liberty truck will continue. Orders will be placed immediately for 1,500 three-quarter-ton trucks probably with the General Motors Company and for 2,500 chassis of one and a half tons with different makers. About 2,400 large type Liberty trucks have been produced. The output probably will reach 10,000 by August 1. Plans contemplate 8,000 more and 8,000 large commercial trucks of three to five tons capacity, with four-wheel drive.

NEWS OF THE SOCIETIES

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City," by Charles L. Craig, comptroller; "The Regulation of Capital Issues for Local Improvements and Maturing State and Municipal Debts," by Paul M. Warburg, vice-governor, Federal Reserve Board, and "A War Chest for Public Improvements," by Andrew J. Peters, mayor of Boston.

At the luncheon session at the Hotel Astor the general topic will be "The Government as Employer." Brief addresses will be made by representative labor leaders and government officials, including Franklin D. Roosevelt, assistant secretary of the Navy; Samuel Gompers, president of the American Federation of Labor, and V. Everit Macy, chairman of the Shipbuilding Labor Adjustment Board.

"The New Era in Budgets" will be the theme of the fourth session, held at 3 p. m. Thursday in the Belvedere Room of the Astor. The presiding officer will be Victor Morawetz, and the following program will be presented: "First Steps Toward a Budget System," by W. F. Willoughby, director, Institute for Governmental Research, Washington, D. C.; "The New Jersey Budget Law," by Arthur N. Pierson of the New Jersey Assembly, chairman of the Commission for the Survey of Municipal Financing of New Jersey; "Budget Reorganization in Illinois," by Governor Frank O. Lowden; "The First State Executive Budget," by Governor Emerson C. Harrington of Maryland, and discussion of the general topic by Howard L. McBain, professor of municipal administration at Columbia University, and Thomas W. Lamont, of J. P. Morgan & Co.

At the joint war-time supper at the City Club informal discussion will be centered on "New Duties of City and State Governments in War Times."

The president of the National Municipal League is Lawson Purdy of New York, and the secretary is Clinton Rogers Woodruff, 703 North American Building, Philadelphia, Pa.

Associated Highways Organizations of Pennsylvania.

The Associated Highways Organization of Pennsylvania was formed at a meeting of good roads enthusiasts recently held in the Capitol at Harrisburg. It is a federation consisting of representatives of all good roads organizations in the state. Represented at the meeting were the Lincoln Highway, William Penn Highway, National Old Trails, Buffalo-Pittsburgh trail, McKean, County Good Roads Association, Jefferson County Good Roads Association, the Lackawanna trail, Sullivan trail, Susquehanna trail, Perry Highway, Trans-Pennsylvania Road Association, Black Diamond Highway and other organizations. Officers elected were: Ex-Senator John S. Fisher, Indiana, president; Dr. P. T. Johnson, Erie, vice-president; William Jennings, Harrisburg, treasurer, and M. H. James, Harrisburg, secretary.

American Association of Engineers.

The American Association of Engineers, at the annual convention to be held in the City Club, Chicago, May 14, elected a president and a board of directors, the nominations for which, recently announced, were as follows:

President—W. H. Finley, chief engineer, C. & N. W. Ry.

First Vice-President—H. W. Clausen, construction engineer, city of Chicago.

Second Vice-Presidents—L. K. Sherman, Chicago, president L. K. Sherman Company, engineers; A. D. Whipple, Chicago, chief engineer, Portland Cement Association.

Directors—Harold Almert, consulting engineer, Chicago; F. K. Bennett, Minneapolis, assistant chief engineer, M. & St. L. Ry.; T. M. Chapman, Savannah, Ga., land and tax engineer, C. of Ga. Ry.; C. U. Freund, civil engineer, Washington, D. C.; W. A. Goss, Chicago, engineer, Interstate Commerce Commission; J. N. Hatch, Chicago, consulting engineer; Samuel Moreel, engineer of bridges; city of Chicago; Charles A. Morey, president, Chicago Technical College; Alexander Potter, New York, consulting engineer; J. H. Prior, Chicago, consulting engineer; Warwick Ray, Chicago, engineer, Western Electric Co.; C. B. Reed, Chicago, engineer, Illinois Central Railway; E. O. Schweitzer, Chicago, chief testing engineer, Commonwealth Edison Company; C. B. Scott, Richmond, member, Virginia State Highway Commission; F. L. Thompson, Chicago, assistant chief engineer, I. C. R. R.; P. B. Waldin, Pittsburg, district sales manager, Marchant Calculating Machine Company; F. R. Weller, Washington, consulting engineer.